00108859

THE
ASIATIC SOCIETY OF BOMBAY
TOWN HALL, BOMBAY-1.

Digitized with financial assistance from
Government of Maharashtra
on 24 February, 2020

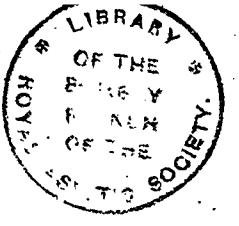
Royal Commission on Agriculture in India.

VOLUME XIII.

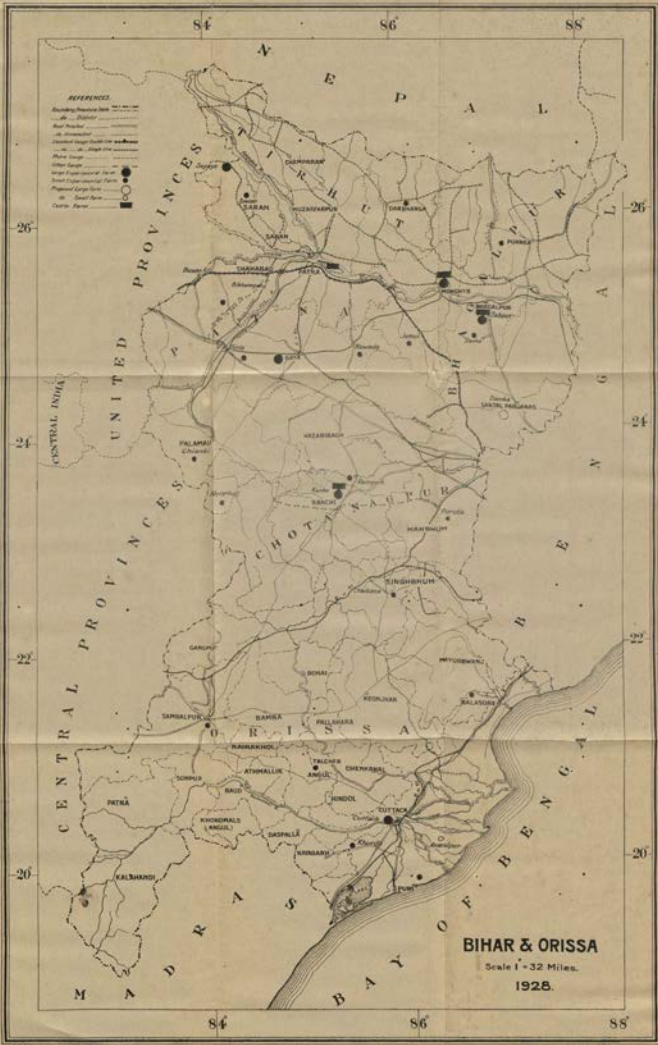
00108859

Evidence taken in Bihar and Orissa.

108859



LONDON:
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.
To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh;
York Street, Manchester; 1, St. Andrew's Crescent, Cardiff;
15, Donegall Square West, Belfast;
or through any Bookseller.
1928
PRINTED IN INDIA
Price 6s. 3d. net.


BIHAR & ORISSA
Scale 1" = 32 Miles.
1928.
NEPAL
UNITED PROVINCES
CENTRAL PROVINCES
CENTRAL INDIA
MADRAS
BAY OF BENGAL
BENGAL
TIRHUT
PATNA
BHAGALPUR
CHOTANAGPUR
ORISSA
CHAMPARAN
SARAN
MUZAFFARPUR
DARBHANGA
PURNEA
SHAHABAD
PATNA
MONGHYR
BHAGALPUR
GAYA
SANTAL PARGANAS
HAZARIBAGH
PALAMAU
RANCHI
MANBHUM
SINGHBHUM
GANGPUR
BONAI
MAYURBHANJ
KEONJHAR
BALASORE
SAMBALPUR
BAMRA
PALLAHARA
NAIRAKHOL
TALCHER
ANGUL
CHENKANAL
ATHMALLIK
SONPUR
BAUD
HINDOL
PATNA
CUTTACK
KHONDMALS (ANGUL)
DASPALLA
KRISHNAGARH
KALSHANDI
PURI
84°
86°
88°
26°
24°
22°
20°

CONTENTS

	PAGES
Terms of Reference	*iii*
Questionnaire	*iv-xiii*
Introduction	*xiv-xlix*
Evidence of :—	
(1) Mr. J. Henry, Lohat Sugar Works	1-14
(2) Mr. C. G. Atkins, The Dowlatpore Agricultural Concern, Rusera Ghat	15-36
(3) Babu Ganga Vishnu, Planter, Muzaffarpur	37-47
(4) Mr. A. C. Dobbs, Director of Agriculture	48-117
(5) Mr. D. Quinlan, M.R.C.V.S., I.V.S., Director, Civil Veterinary Department	118-158
(6) Rai Bahadur Durga Prasad, M.A., Registrar of Co-operative Societies	159-197
(7) Mr. Devaki Prasad Sinha, M.A., M.L.C., Patna	197-216
(8) Mr. W. B. Heycock, I.C.S., Commissioner, Patna Division ..	217-256
(9) Babu Arikshan Sinha, Pleader, General Secretary, Bihar Provincial Kisan Sabha	256-277
(10) Mr. A. D. Tuckey, I.C.S., Director of Land Records and Surveys	277-298
(11) Babu Mithila Saran Sinha, Advocate, Bankipur District ..	298-301
(12) Mr. Gurusahai Lal, M.L.C., Vakil	302-309
(13) Mr. K. R. Bery, Superintending Engineer, Irrigation ..	309-315
(14) Mr. H. Lambert, M.A., I.E.S., Officiating Director of Public Instruction .. .. and (15) Mr. F. R. Blair, M.A., I.E.S., Deputy Director of Public Instruction	316-334
(16) Lt.-Col. W. C. Ross, I.M.S., Director of Public Health ..	335-349
(17) Mr. D. R. Sethi, M.A., B.Sc. (Edin.), I.A.S., Deputy Director of Agriculture	349-373
(18) Babu Tara Prasanna Ghose, Ranchi	373-407
(19) Babu Birbar Narayan Chandra Dhir Narendra, Garhmadhupur	407-415
(20) Mr. J. H. Lyall, B.A., Officiating Conservator of Forests ..	416-429
(21) Mr. N. Meyrick, General Secretary, Bihar Planters' Association, Ltd., Motihari	429-440
(22) Moulvi Saiyid Muhammad Ahsan Khan, Zamindar and Secretary of the Barh Agricultural Association, Barh ..	440-456
(23) Mr. S. K. Roy, M.A., Principal, Gossner High School, Ranchi	456-476
(24) Mrs. R. V. Norris, Director and Bio-Chemist, Lac Research Institute, Namkum	476-482
(25) Mr. N. K. Roy, Assistant Registrar of Co-operative Societies, Ranchi Circle	482-504
Index	505-630
Glossary	631-634

MO Y 393—*a*

TERMS OF REFERENCE

Generally,

To examine and report on the present conditions of agriculture and rural economy in British India and to make recommendations for the improvement of agriculture and the promotion of the welfare and prosperity of the rural population;

In particular to investigate—

(*a*) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock;

(*b*) the existing methods of transport and marketing of agricultural produce and stock;

(*c*) the methods by which agricultural operations are financed and credit afforded to agriculturists;

(*d*) the main factors affecting rural prosperity and the welfare of the agricultural population;

and to make recommendations.

It will not be within the scope of the Commission's duties to make recommendations regarding the existing system of landownership and tenancy or of the assessment of land revenue and irrigation charges, or the existing division of functions between the Government of India and the local Governments. But the Commission shall be at liberty to suggest means whereby the activities of the Governments in India may best be co-ordinated and to indicate directions in which the Government of India may usefully supplement the activities of local Governments.

QUESTIONNAIRE

PART I

Question.

1. Research.
2. Agricultural Education.
3. Demonstration and Propaganda.
4. Administration.
5. Finance.
6. Agricultural Indebtedness.
7. Fragmentation of Holdings.

PART II

8. Irrigation.
9. Soils.
10. Fertilisers.
11. Crops.
12. Cultivation.
13. Crop Protection.
14. Implements.

PART III

15. Veterinary.
16. Animal Husbandry.

PART IV

17. Agricultural Industries.
18. Agricultural Labour.
19. Forests.
20. Marketing.
21. Tariffs and Sea Freights.
22. Co-operation.
23. General Education.
24. Attracting Capital.
25. Welfare of Rural Population.
26. Statistics.

QUESTIONNAIRE

PART I

1. Research.

(*a*) Have you suggestions to advance for the better organisation, administration and financing of—

(*i*) All research affecting the welfare of the agriculturist, including research into the scientific value of the indigenous theory and traditional methods of agriculture,

(*ii*) Veterinary research ?

(*b*) If in cases known to you progress is not being made because of the want of skilled workers, or field or laboratory facilities for study or by reason of any other handicaps, please give particulars. [Suggestions of a general kind should be made under (*a*) ; answers under this heading should relate to specific subjects. The purpose is to secure a list of the problems met with by scientific investigators in the course of their work which are being held over because of lack of resources or deficient organisation.]

(*c*) Can you suggest any particular subject for research not at present being investigated to which attention might usefully be turned ?

2. Agricultural Education.

With reference to any form of agricultural education of which you may have experience, please state your views on the following :—

(*i*) Is the supply of teachers and institutions sufficient ?

(*ii*) Is there an urgent need for extension of teaching facilities in any district or districts known to you personally ?

(*iii*) Should teachers in rural areas be drawn from the agricultural classes ?

(*iv*) Are the attendances at existing institutions as numerous as you would expect in present circumstances ; if not, state reasons. Can you suggest measures likely to stimulate the demand for instruction ?

(*v*) What are the main incentives which induce lads to study agriculture ?

(*vi*) Are pupils mainly drawn from the agricultural classes ?

(*vii*) Are there any modifications in existing courses of study which appear to be called for ; if so, what are they ?

(*viii*) What are your views upon (*a*) nature study ; (*b*) school plots ; (*c*) school farms ?

(*ix*) What are the careers of the majority of students who have studied agriculture ?

(*x*) How can agriculture be made attractive to middle class youths ?

(*xi*) Are there recent movements for improving the technical knowledge of students who have studied agriculture ?

(*xii*) How can adult education in rural tracts be popularised ?

(*xiii*) In suggesting any scheme for better educational facilities in rural areas, please give your views for (*a*) its administration and (*b*) its finance.

3. Demonstration and Propaganda.

(*a*) What are the measures which in your view have been successful in influencing and improving the practice of cultivators ?

(*b*) Can you make suggestions for increasing the effectiveness of field demonstrations ?

(*c*) Can you suggest methods whereby cultivators may be induced to adopt expert advice ?

(*d*) If you are aware of any striking instances of the success or the failure of demonstration and propaganda work, please give particulars and indicate the reasons for success or for failure.

4. Administration.

(*a*) Do you wish to suggest means towards the better co-ordination of the activities of the Governments in India or to indicate directions in which the Government of India may usefully supplement the activities of the local Governments ?

(*b*) Is it your opinion that the expert scientific knowledge required in the development of agriculture in the different Provinces could be supplied to a greater extent than is the case at present by increasing the scientific staff of the Government of India ? If so, indicate the types of work which would benefit by pooling the services of experts, and suggest how that work should be controlled.

(*c*) Are you satisfied from the agricultural standpoint with the services afforded by—

(*i*) The Agricultural and Veterinary Services,
(*ii*) Railways and steamers,
(*iii*) Roads,
(*iv*) Meteorological Department,
(*v*) Posts, and
(*vi*) Telegraphs, including wireless ?

If not, please indicate directions in which you think these Services might be improved or extended.

5. Finance.

(*a*) What are your views as to the steps that should be taken for the better financing of agricultural operations and for the provision of short and long-term credit to cultivators ?

(*b*) Do you wish to suggest means whereby cultivators may be induced to make fuller use of the Government system of *taccavi* ?

6. Agricultural Indebtedness.

(*a*) What in your opinion are :—

(*i*) the main causes of borrowing,
(*ii*) the sources of credit, and
(*iii*) the reasons preventing repayment.

(*b*) What measures in your opinion are necessary for lightening agriculture's burden of debt ? For example, should special measures be taken to deal with rural insolvency, to enforce the application of the Usurious Loans Act, or to facilitate the redemption of mortgages ?

(*c*) Should measures be taken to restrict or control the credit of cultivators such as limiting the right of mortgage and sale ? Should non-terminable mortgages be prohibited ?

7. Fragmentation of Holdings.

(*a*) Do you wish to suggest means for reducing the loss in agricultural efficiency attendant upon the excessive subdivision of holdings ?

(*b*) What are the obstacles in the way of consolidation and how can they be overcome ?

(*c*) Do you consider legislation to be necessary to deal with minors, widows with life interest, persons legally incapable, alienation and dissentients, and to keep disputes out of the courts ?

PART II

8. Irrigation.

(*a*) Name any district or districts in which you advocate the adoption of new irrigation schemes, or suggest extensions or improvements in the existing systems or methods of irrigation by—

(*i*) Perennial and non-perennial canals,
(*ii*) Tanks and ponds,
(*iii*) Wells.

What are the obstacles in your district or Province to the extension of irrigation by each of the above methods ?

(*b*) Are you satisfied with the existing methods of distributing canal water to cultivators ? Describe the methods that have been employed to prevent wastage of water by evaporation and by absorption in the soil. What form of outlet for distribution to cultivators at the tail end do you regard as the most equitable and economical ? Have these methods and devices been successful, or do you wish to suggest improvements ?

(*N.B.*—Irrigation charges are *not* within the terms of reference of the Commission, and should not be commented upon.)

9. Soils.

(*a*) Have you suggestions to make—

(*i*) for the improvement of soils, whether by drainage or other means, not dealt with under other headings in this questionnaire.
(*ii*) for the reclamation of Alkali (Usar) or other uncultivable land,
(*iii*) for the prevention of the erosion of the surface soil by flood water ?

(*b*) Can you give instances of soils known to you which, within your recollection, have—

(*i*) undergone marked improvement,
(*ii*) suffered marked deterioration ?

If so, please give full particulars.

(*c*) What measures should Government take to encourage the reclamation of areas of cultivable land which have gone out of cultivation ?

10. Fertilisers.

(*a*) In your opinion, could greater use be profitably made of natural manures or artificial fertilisers ? If so, please indicate the directions in which you think improvement possible.

(*b*) Can you suggest measures to prevent the fraudulent adulteration of fertilisers ?

(*c*) What methods would you employ to popularise new and improved fertilisers ?

(*d*) Mention any localities known to you in which a considerable increase in the use of manures has recently taken place.

(*e*) Has effect of manuring with phosphates, nitrates, sulphate of ammonia, and potash manures been sufficiently investigated ? If so, what is the result of such investigation ?

(*f*) What methods would you employ to discourage the practice of using cowdung as fuel ?

11. Crops.

(*a*) Please give your views on—

(*i*) the improvement of existing crops,

(*ii*) the introduction of new crops including fodder crops,

(*iii*) the distribution of seeds,

(*iv*) the prevention of damage by wild animals.

(*b*) Can you suggest any heavy yielding food crops in replacement of the present crops ?

(*c*) Any successful efforts in improving crops or substituting more profitable crops which have come under your own observation should be mentioned.

12. Cultivation.

Can you suggest improvements in—

(*i*) the existing system of tillage, or

(*ii*) the customary rotations or mixtures of the more important crops ?

13. Crop Protection, Internal and External.

Please give your views on—

(*i*) The efficacy and sufficiency of existing measures for protection of crops from external infection, pests and diseases.

(*ii*) The desirability of adopting internal measures against infection.

14. Implements.

(*a*) Have you any suggestion for the improvement of existing, or the introduction of new, agricultural implements and machinery ?

(*b*) What steps do you think may usefully be taken to hasten the adoption by the cultivator of improved implements ?

(*c*) Are there any difficulties which manufacturers have to contend with in the production of agricultural implements or their distribution for sale throughout the country ? If so, can you suggest means by which these difficulties may be removed ?

Part III

15. Veterinary.

(*a*) Should the Civil Veterinary Department be under the Director of Agriculture or should it be independent ?

(*b*) (*i*) Are dispensaries under the control of Local (District) Boards ? Does this system work well ?

(*ii*) Is the need for expansion being adequately met ?

(*iii*) Would you advocate the transfer of control to Provincial authority ?

(*c*) (*i*) Do agriculturists make full use of the veterinary dispensaries ? If not, can you suggest improvements to remedy this ?

(*ii*) Is full use made of touring dispensaries ?

(*d*) What are the obstacles met with in dealing with contagious diseases ? Do you advocate legislation dealing with notification, segregation, disposal of diseased carcases, compulsory inoculation of contacts and prohibition of the movement of animals exposed to infection ? Failing legislation, can you suggest other means of improving existing conditions ?

(*e*) Is there any difficulty in securing sufficient serum to meet the demand ?

(*f*) What are the obstacles in the way of popularising preventive inoculation ? Is any fee charged, and, if so, does this act as a deterrent ?

(*g*) Do you consider that the provision of further facilities for research into animal disease is desirable ?

If so, do you advocate that such further facilities should take the form of—

(*i*) an extension of the Muktesar Institute, or

(*ii*) the setting up, or extension of, Provincial Veterinary Research Institutions ?

(*h*) Do you recommend that special investigations should be conducted by—

(*i*) officers of the Muktesar Institute, or

(*ii*) research officers in the Provinces ?

(*i*) Do you recommend the appointment of a Superior Veterinary Officer with the Government of India ? What advantages do you expect would result from such an appointment ?

16. Animal Husbandry.

(*a*) Do you wish to make suggestions for—

(*i*) improving the breeds of livestock,

(*ii*) the betterment of the dairying industry,

(*iii*) improving existing practice in animal husbandry

(*b*) Comment on the following as causes of injury to cattle in your district—

(*i*) Overstocking of common pastures,

(*ii*) Absence of enclosed pastures, such as grass borders in tilled fields,

(*iii*) Insufficiency of dry fodder such as the straw of cereals or the stems and leaves of pulses,

(*iv*) Absence of green fodders in dry seasons,

(*v*) Absence of mineral constituents in fodder and feeding stuffs.

(*c*) Please mention the months of the year in which fodder shortage is most marked in your district. For how many weeks does scarcity of fodder usually exist ? After this period of scarcity ends how many weeks elapse before young growing cattle begin to thrive ?

(*d*) Can you suggest any practicable methods of improving or supplementing the fodder supply that would be applicable to your district ?

(*e*) How can landowners be induced to take a keener practical interest in these matters ?

Part IV

17. Agricultural Industries.

(*a*) Can you give any estimate of the number of days of work done by an average cultivator on his holding during the year ? What does he do in the slack season ?

(*b*) Can you suggest means for encouraging the adoption of subsidiary industries ? Can you suggest any new subsidiary industries to occupy the spare time of the family which could be established with Government aid ?

(*c*) What are the obstacles in the way of expansion of such industries as beekeeping, poultry rearing, fruit growing, sericulture, pisciculture, lac culture, rope making, basket making, etc. ?

(*d*) Do you think that Government should do more to establish industries connected with the preparation of agricultural produce for consumption, such as oil pressing, sugar making, cotton ginning, rice hulling, utilisation of wheat straw for card-board, utilisation of cotton seed for felt, fodder, oil and fuel, utilisation of rice straw for paper, etc. ?

(*e*) Could subsidiary employment be found by encouraging industrial concerns to move to rural areas ? Can you suggest methods ?

(*f*) Do you recommend a more intensive study of each rural industry in its technical, commercial and financial aspects, with a view to, among other things, introduction of improved tools and appliances ?

(*g*) Can you suggest any other measures which might lead to greater rural employment ?

(*h*) Can you suggest means whereby the people could be induced to devote their spare time to improving the health conditions of their own environment ?

18. Agricultural Labour.

(*a*) What measures, if any, should be taken to attract agricultural labour from areas in which there is a surplus to—

(*i*) areas under cultivation in which there is a shortage of such labour ? and

(*ii*) areas in which large tracts of cultivable land remain uncultivated ?

Please distinguish between suggestions designed to relieve seasonal unemployment and proposals for the permanent migration of agricultural population.

(*b*) If there is any shortage of agricultural labour in your Province, what are the causes thereof and how could they be removed ?

(*c*) Can you suggest measures designed to facilitate the occupation and development, by surplus agricultural labour, of areas not at present under cultivation ?

19. Forests.

(*a*) Do you consider that forest lands as such are at present being put to their fullest use for agricultural purposes ? For instance, are grazing facilities granted to the extent compatible with the proper preservation of forest areas ? If not, state the changes or developments in current practice which you consider advisable.

(*b*) Can you suggest means whereby the supply of firewood and fodder in rural areas may be increased ?

(*c*) Has deterioration of forests led to soil erosion ? What remedies would you suggest for erosion and damage from floods ?

(*d*) Can you indicate any methods by which supply of moisture in the soil, the rainfall and supply of canal water can be increased and regulated by afforestation or by the increased protection of forests so as to benefit agriculture ? Would the same methods be useful in preventing the destruction by erosion of agricultural land ?

(*e*) Is there an opening for schemes of afforestation in the neighbourhood of villages ?

(*f*) Are forests suffering deterioration from excessive grazing ? Is soil erosion being thereby facilitated ? Suggest remedies.

20. Marketing.

(*a*) Do you consider existing market facilities to be satisfactory ? Please specify and criticise the markets to which you refer, and make suggestions for their improvement.

(*b*) Are you satisfied with the existing system of marketing and distribution ? If not, please indicate the produce to which you refer and describe and criticise in detail the channels of marketing and distribution from the producer to the consumer in India (or exporter in the case of produce exported overseas). State the services rendered by each intermediary and whether such intermediary acts in the capacity of merchant or commission agent, and comment upon the efficiency of these services and the margins upon which such intermediaries operate. Please describe

the method by which each transaction is financed, or in the case of barter, by which an exchange is effected.

(*c*) Do you wish to suggest steps whereby the quality, purity, grading or packing of agricultural produce may be improved, distinguishing where possible between produce destined for—

(*i*) Indian markets ?

(*ii*) Export markets ?

(*d*) Do you think that more effective steps might be taken to place at the disposal of cultivators, merchants and traders information as to market conditions, whether Indian or overseas ; crop returns ; complaints as to Indian produce from wheresoever originating ; and agricultural and marketing news in general ?

21. Tariffs and Sea Freights.

Do existing (*a*) customs duties, both import and export, and (*b*) sea freights adversely affect the prosperity of the Indian cultivator ? If so, have you any recommendations to make ?

22. Co-operation.

(*a*) What steps do you think should be taken to encourage the growth of the co-operative movement—

(*i*) by Government,

(*ii*) by non-official agencies ?

(*b*) Have you any observations to make upon—

(*i*) Credit societies ;

(*ii*) Purchase societies ;

(*iii*) Societies formed for the sale of produce or stock ;

(*iv*) Societies for effecting improvements—*e.g.*, the digging of wells and the construction of bunds, walls and fences, or the planting of hedges ;

(*v*) Societies formed for the aggregation of fragmented holdings and their redistribution in plots of reasonable size ;

(*vi*) Societies for the co-operative use of agricultural machinery ;

(*vii*) Societies for joint farming ;

(*viii*) Cattle breeding societies ;

(*ix*) Societies formed for any purpose connected with agriculture or with the betterment of village life, but not specified above ?

(*c*) Where co-operative schemes for joint improvement, such as co-operative irrigation or co-operative fencing or a co-operative consolidation of holdings scheme, cannot be given effect to owing to the unwillingness of a small minority to join, do you think legislation should be introduced in order to compel such persons to join for the common benefit of all ?

(*d*) Do you consider that those societies of which you have personal knowledge have, in the main, achieved their object ?

23. General Education.

(*a*) Do you wish to make observations upon existing systems of education in their bearing upon the agricultural efficiency of the people ? If you make suggestions, please distinguish, as far as possible, between—

(*i*) Higher or collegiate,

(*ii*) Middle school, and

(*iii*) Elementary school education.

(*b*) (*i*) Can you suggest any methods whereby rural education may improve the ability and culture of agriculturists of all grades while retaining their interest in the land ?

(*ii*) What is your experience of compulsory education in rural areas ?

(*iii*) What is the explanation of the small proportion of boys in rural primary schools who pass through the fourth class ?

24. Attracting Capital.

(*a*) What steps are necessary in order to induce a larger number of men of capital and enterprise to take to agriculture ?

(*b*) What are the factors tending to discourage owners of agricultural land from carrying out improvements ?

25. Welfare of Rural Population.

(*a*) Outside the subjects enumerated above, have you any suggestions to offer for improving hygiene in rural areas and for the promotion of the general well-being and prosperity of the rural population ?

(*b*) Are you, for instance, in favour of Government conducting economic surveys in typical villages with a view to ascertaining the economic position of the cultivators ? If so, what, in your opinion, should be the scope and methods of such enquiries ?

(*c*) If you have carried out anything in the nature of such intensive enquiry, please state the broad conclusions which you reached.

26. Statistics.

(*a*) Do you wish to make suggestions for the extension or improvement of the existing methods of—

(*i*) ascertaining areas under cultivation and crops ;

(*ii*) estimating the yield of agricultural produce ;

(*iii*) enumerating livestock and implements ;

(*iv*) collecting information on land tenure, the incidence of land revenue and the size of the agricultural population ;

(*v*) arranging and publishing agricultural statistics ?

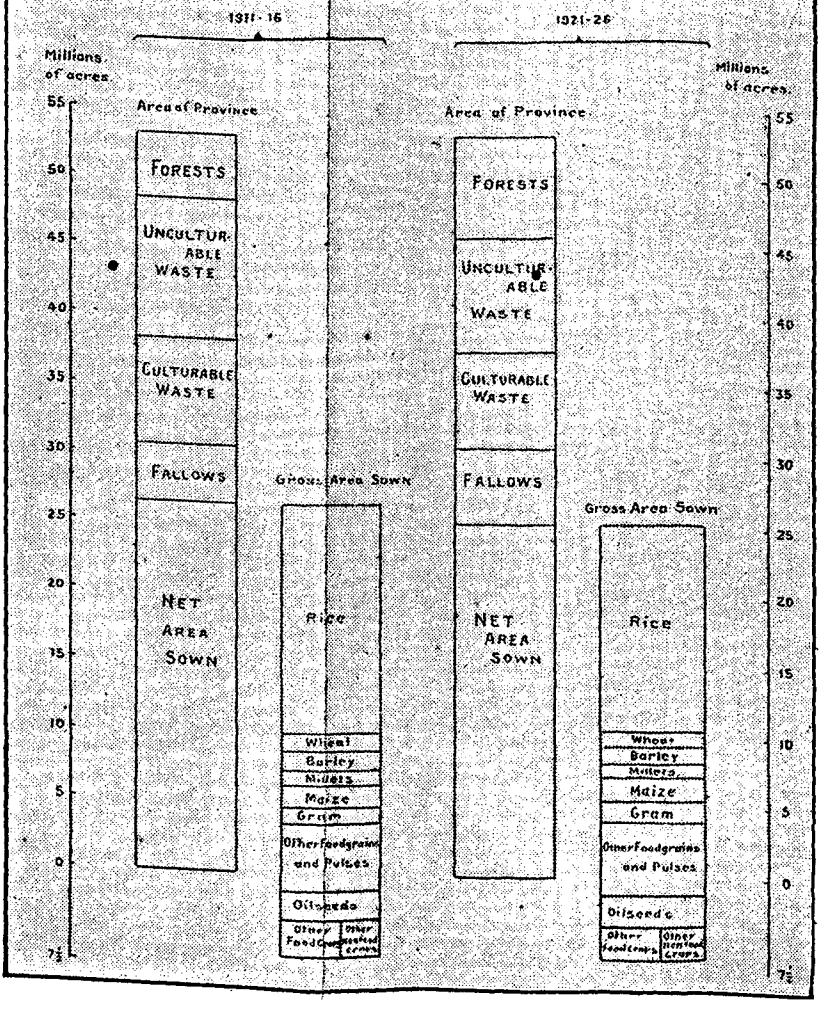
(*b*) Have you any other suggestions to make under this heading ?

BIHAR AND ORISSA

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 YEARS AVERAGES)

Note:- The difference between the Gross Area Sown and the Net Area Sown represents the area sown more than once.



INTRODUCTION

		PAGE
1.	General Features and Natural Divisions ..	xv
2.	Provincial Income and Expenditure ..	xvii
3.	Revenue Administration and Land Records ..	xxiii
4.	The Cultivator ..	xxv
5.	The Agricultural Department ..	xxix
6.	Livestock work and the Veterinary Department ..	xxxiii
7.	Irrigation ..	xxxvi
8.	Forestry in relation to Agriculture ..	xxxviii
9.	General Education ..	*Ibid*
10.	Co-operation ..	xli
11.	Communications and Marketing ..	xliii
12.	Local Self-Government ..	xliv
13.	Public Health and Sanitation ..	xlvii

BIHAR AND ORISSA

1. GENERAL FEATURES AND NATURAL DIVISIONS.

The Province of Bihar and Orissa, which was formed in 1912 from the Patna, Tirhut, Bhagalpur, Chota Nagpur and Orissa divisions of the Bengal Presidency has an area of 71,552,000 acres or nearly twice that of England and Wales. This area, according to the census of 1921, carried a population of 37,961,858, and some of the agricultural land in North Bihar carries a greater number of people than any other agricultural area in India. Of this area, however, no less than 18,334,720 acres are occupied by Feudatory States.

The physical conditions of the province are diverse ; within the oblong of some 450 miles from north to south and 250 miles east to west, which is the general shape of the province, a traveller entering from the State of Nepal, which bounds the province to the north, would traverse the rich alluvial plain of Bihar for the first 150 miles, crossing the Ganges about half way. This plain is succeeded by the thinly peopled areas of Chota Nagpur, also about 150 miles in length, which contains rich deposits of coal, iron, mica and copper, the first three of which are extensively worked. This tract of gneissic rocks forming high undulating plateaux fringed by hills, rocks and jungle is very distinctive in appearance from the alluvial areas which lie to the north and south of it. Jamshedpur, where the Tata Iron and Steel Company, as well as other companies, have their works is the great iron and steel producing centre of India. A third journey of nearly equal length to the first two, through the Feudatory States, where the hills of Chota Nagpur sink towards the Mahanadi delta and the Orissa coast, would bring the traveller to the southern boundary of the province and the Madras Presidency.

There are valuable forests in the Chota Nagpur tract and parts of Orissa are well wooded. Jheels or shallow sheets of water are of frequent occurrence throughout the province, and in Orissa there is the extensive, though very shallow, Chilka Lake [44 miles in length].

The rainfall increases from north to south ; in Bihar it averages 50 inches, in Chota Nagpur 53 and in Orissa 58 inches. The most regular rainfall is in Chota Nagpur. Severe droughts are experienced from time to time in both the Bihar and Orissa divisions. The famine of 1866 in the latter area was one of the worst famines of which we have record. About ninety per cent of the rain throughout the province falls in the monsoon between June and October, the remaining ten per cent falling as light rain in December, January and February, and isolated thunderstorms which occur in May. During the monsoon the littoral districts of Orissa are subject to floods which cause great damage.

The warmest weather occurs in May with a mean temperature ranging between 85° and 94° and a maximum day temperature of 91° to 107°. In some districts, the temperature rises as high as 115°. There is a decided period of cold weather throughout the province, with day temperatures in December and January nowhere exceeding 71° and

falling at night in Bihar and Chota Nagpur to about 51° and in Orissa to 57°. The cold weather in Orissa is very short and less marked than elsewhere. Frost occurs occasionally in the Chota Nagpur plateau of sufficient severity to do considerable damage to plantations of *sal*, etc., but is rare elsewhere in the province.

In regard to the character of the soil, the province has two well defined types: the alluvial tracts, covering practically the whole of Bihar and the coast fringe of Orissa, and the gneissic tracts. Laterite soils are also met with in patches sloping upwards from the alluvium of Orissa towards the interior of the province and forming patches overlying the general gneissic soils of the Chota Nagpur plateau. Except in the Mahanadi delta and the great river beds, practically all the alluvium is of the older type which generally speaking consists of alternating beds of sand and clay and north of the Ganges frequently contains large quantities of *kankar*, that is nodules of carbonate of lime. From the agricultural point of view, the chief interest is the extraordinary range of differences in the surface quality of this older alluvium due partly to differences in level but partly also to general differences in chemical and physical composition. In the district of Tirhut in which the Pusa Research Station is situated, the texture of the soil and its retentiveness of moisture is, so far as is known, unique. The general characteristic of the new alluvium is that it is richer in plant food than the older alluvia particularly in nitrogen. Most crops do well on the alluvial soils; rice is grown extensively whenever the supply of water is adequate and where it is not, fruits and vegetables are extensively grown with the assistance of well irrigation; sugarcane does well on the alluvium with clay and loam surfaces; tobacco and maize are crops especially suited for the lighter loam; and members of the gourd family are extensively grown along the sandy beds of the rivers.

In the gneissic area of the Chota Nagpur plateau with its extension into southern Bihar, the soil has been formed *in situ* from the break down of the crystalline rock composed of quartz, felspar and mica. Terracing has resulted in the formation of much valuable rice land and in the depressions between the ridges a good deal of rice is grown. Other crops are maize, millets, oil-seeds and pulses.

The laterite soils, varying from a conglomerate mass of haematite nodules and coarse quartz sand to loose gravel and sandy clay, are agriculturally of no importance.

The importance of rice as a crop has already been referred to and the place which it takes among the other principal crops of the province is shown by the accompanying diagram; it is grown throughout the province. Of the cereals, maize, barley, wheat and *marua* (*eleusine coracana*) are next in importance to rice in regard to the area which they occupy (which is, however, only some 5,000,000 acres as compared with about 14,000,000 acres under rice). The maize, barley and wheat are grown chiefly in Bihar and in the low hills in the south and east. *Marua* is also grown in Bihar but its especial area is the Chota Nagpur plateau where it is the next most important crop to rice. The pulses and other

food grains occupy about 7,000,000 acres. Oil-seeds are also important not only as a crop, but because half of the harvest keeps 35 oil mills going in the provinces throughout the year. The balance is exported. The total area under oil-seeds (excluding niger) is about 2,000,000 acres, of which linseed occupies forty per cent. Although sugarcane, jute and tobacco occupy only about 700,000 acres they are, with fruits and vegetables which are cultivated on some 600,000 acres, extremely important in the agricultural economy; condiments, chillies, turmeric and ginger are also grown in Bihar and in the case of chillies a valuable export trade is done. The oil-seeds, sugarcane, tobacco, jute (practically confined to the Purnea district) and fruits and vegetables are all grown chiefly in Bihar and very largely in North Bihar. The major part of the cereals, even of rice, is similarly grown in Bihar. The overwhelming importance of Bihar in the agriculture of the province will thus be evident. Cocoanuts and cashewnuts are important local crops in Orissa.

A periodical census of livestock is taken. The last census was taken in 1925 and did not, except in regard to sheep and goats which are dealt with separately, show any appreciable increase over the census taken in 1920. The figures, excluding sheep and goats, were: 1920, 19·7 millions; 1925, 20·6 millions. In the last census, there were 6·9 million bulls and bullocks, 5·7 million cows, 2·4 million buffaloes and 5·7 million young stock, including young buffaloes. There is particular difficulty in securing accuracy in a cattle census in Bihar and Orissa owing to the continual movement of cattle down into Bengal for sale and across the borders into Nepal for grazing, but at any rate the figures of the last two censuses should be strictly comparable as they were both taken at the same time of year (January).

In 1913, the number of sheep and goats was estimated at 6½ millions; in 1920, the number had fallen to a little over 4 millions owing to the high prices obtainable during the War for meat and hides, and also to the scarcity prevailing in 1919 in the breeding areas; by 1925 these losses had been rather more than made good and sheep and goats were returned at 7 millions. Goats are bred throughout Bihar and there is a constant demand for them from the Calcutta market. Sheep breeding is carried on mainly in Bihar towards the United Provinces side. Sheep are also kept in Chota Nagpur.

2. PROVINCIAL INCOME AND EXPENDITURE.

The permanent settlement of land revenue in 1793, if it is not quite so dominating a feature in the income derived from land revenue as is the case in Bengal, is yet the most important factor in the provincial finances. The incidence per head of land revenue assessment is the lowest of any province in India, lower even than in Bengal. Owing to the fact that the greater part of the Orissa divison is temporarily settled some power of expansion exists as the following figures indicate:—

	1901-02	1911-12	1925-26
	Rs. (lakhs)	Rs. (lakhs)	Rs. (lakhs)
Land Revenue	143	157	167

But the growing needs of the province obviously cannot be met from this source. Excise revenue shows a marked elasticity, having risen from 124 lakhs in 1921-22 to 197 lakhs in 1925-26 and the revenue derived from stamps also shows a satisfatory increase in the same period. Still, the revenue of the province compares very poorly with that of a province like Bombay, which raises three times as much revenue from a population about two-thirds that of Bihar and Orissa population. Of any new expenditure permitted by these somewhat meagre resources, the transferred side of Government, which includes the nation building departments of Agriculture, Education, and the Medical and Public Health services, takes a overwhelming proportion. Indeed, in the three years ending 1926-27, the proportion averaged ninety-three per cent.

GOVERNMENT OF BIHAR AND ORISSA

Revenue and Expenditure charged to Revenue

GOVERNMENT OF

(Figures are in

Revenue and

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26
Revenue Receipts					
Principal Heads of Revenue—					
Land Revenue	164	165	166	168	167
Excise	124	154	183	176	197
Stamps	87	95	96	100	108
Forest	9	9	10	11	10
Other heads	19	16	17	16	17
Irrigation	18	17	18	18	23
Debt—Interest	3	3	4	5	7
Civil Administration—					
Administration of Justice	3	4	4	5	5
Jails and Convict Settlements	5	6	6	5	5
Police	1	3	2	2	2
Education	4	4	5	6	6
Medical	1	1	3	5	8
Public Health	..	..	..	1	..
Agriculture	1	1	1	2	2
Other heads	..	1	1	1	1
Civil Works	7	6	6	8	7
Miscellaneous	7	9	7	6	14
Miscellaneous adjustments between Central and Provincial Governments.	..	..	..	1	..
Total Revenue Receipts ..	453	494	529	536	579

BIHAR AND ORISSA

lakhs of rupees)

Expenditure charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26
Expenditure charged to Revenue					
Direct Demands on the Revenue—					
Land Revenue	15	16	19	21	21
Forest	10	7	8	8	7
Other heads	18	17	17½	19	32
Capital outlay on Forest charged to Revenue.	..	..	..	..	1
Irrigation—Revenue account	24	23	24	26	26
Irrigation—Capital account charged to Revenue	1	1	½	..	..
Debt Services—Interest	2½	2	3	3½	3½
Civil Administration—					
General Administration	69	72	71	69	70
Administration of Justice	35½	35	35	36½	38
Jails and Convict Settlements	14½	18	16	17	17
Police	81	80	79	81	82
Education	54	54	62	68	77
Medical	17	16	19	26	28
Public Health	3	5	8	9	13
Agriculture	9	9	9	11	11
Industries	3	5	6	7	9
Other departments	2	1	3	1	½
Civil Works	61	59	65	67	74
Miscellaneous	38½	43	40	43	45
Provincial contribution	10	..	..	..	..
Miscellaneous adjustments between Central and Provincial Governments.	..	..	..	..	..
Total Expenditure charged to Revenue .	468	463	485	513	555

GOVERNMENT OF

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26
Capital Receipts					
Revenue Surplus	..	31	44	23	24
Famine Insurance Fund	12	14	12	16	19
Appropriation for Reduction or Avoidance of Debt.	..	..	..	..	..
Suspense	..	4	4	5	1
Loans and Advances by Provincial Governments.	17	16	7	8	10
Loans between Central and Provincial Governments	..	20	7	5	..
Advances from Provincial Loans Fund	..	..	..	..	..
Total Capital Receipts ..	29	85	74	57	54
Opening Balance ..	100	93	143	176	202
Total ..	129	178	217	233	256

BIHAR AND ORISSA

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26
Capital Expenditure					
Revenue Deficit	15	..	..	..	..
Capital Outlay on Forests	..	..	..	..	..
Construction of Irrigation works ..	..	..	—½	..	..
Civil works not charged to Revenue ..	..	..	..	..	..
Other works not charged to Revenue ..	..	..	..	..	..
Famine Insurance Fund	3	..	1	8	3
Appropriation for reduction or avoidance of debt.	..	..	..	..	..
Suspense	..	4	4¼	5	..
Loans and Advances by Provincial Governments.	13	26	31¼	13	3
Loans between Central and Provincial Governments.	5	5	5	5	..
Provincial Loans Fund	..	..	..	..	25¼
Total Capital Expenditure ..	36	35	41	31	31½
Closing Balance ..	93	143	176	202	224½
Total ..	129	178	217	233	256

3. REVENUE ADMINISTRATION AND LAND RECORDS.

For purposes of revenue administration the province is divided into five divisions, Patna, Tirhut, Bhagalpur, Chota Nagpur and Orissa, with a commissioner at the head of each, and 21 districts in charge of a magistrate and collector or deputy commissioner. The unit of revenue administration is the district, and revenue questions which cannot be settled finally by the officer in charge of the district go up (except in respect of Excise and Salt for which there is a special commissioner) to the Divisional Commissioner and from him, if necessary, to the Board of Revenue, which consists of one member. The Member not only deals with revenue questions, but has *inter alia* the very important duty of managing estates under the Court of Wards Act.

For the Orissa Feudatory States there is a special administrative officer designated the Political Agent and Commissioner, who has special revenue and judicial powers.

The main sources of provincial revenue in Bihar and Orissa are land revenue, excise and stamps. The main source of revenue for local self-government is a local cess on the land and on profits from mines, forests, etc., this is not included in the Table of Provincial Income and Expenditure.

For the present purpose, only land revenue will be referred to. The marked feature in the land revenue system of Bihar and Orissa is the fact that the revenue is fixed in the divisions of Patna, Tirhut, Bhagalpur and Chota Nagpur under the permanent settlement concluded by Lord Cornwallis in 1793. The incidence of land revenue per head of population (7$\frac{1}{3}$ annas) is lower than that of any other province in India—Bengal being next with 10$\frac{1}{8}$ annas.

The conditions of this permanent settlement (which confirmed a "decennial" settlement completed in 1791—the first comprehensive settlement undertaken after the succession of the East India Company in 1765 to the Dewani of Bengal, Bihar and Orissa*) were embodied in a proclamation issued on 22nd March, and now known as Regulation I of 1793. It declared that the zamindars, independent talukdars, and other actual proprietors of land with whom the "decennial" settlement had been concluded would be allowed to hold their estates at the same assessment for ever but that "no claims for remission or suspension of rent were to be admitted on any account and lands of proprietors were to be invariably sold for arrears." Proprietors were also declared to have the privilege of transferring their lands without the sanction of Government and partition of estates was freely allowed.

There has been a long history of attempts on the part of Government to regulate equitably the relations between the zamindars and their tenants. The intention at the time of the permanent settlement was to confer an immunity on the ryots against the enhancement of their rents similar to that which had been granted to the zamindars in respect of their assessment. But this intention was soon lost sight of and, on the contrary, with a view to assisting the zamindars to pay their own fixed

* *At that time "Orissa" comprised only a small tract of country now included in the Midnapore district of Bengal.

land revenue to Government, certain powers over the person and crops of a defaulting ryot were given to them in 1799. In 1859, legislation was passed with the object of giving the ryot some measure of protection; this failed, however, of its purpose and the relations between the zamindar and his tenant in the divisions of Patna, Tirhut and Bhagalpur are now regulated by the Bengal Tenancy Act of 1885. The objects of this Act are: (1) to give the settled ryot the same security in his holding as he enjoyed under the old customary law, (2) to ensure to the landlord a fair share of the increased value of the soil and (3) to lay down rules by which all disputed questions between landlord and tenant can be reduced to simple issues and decided upon equitable principles. Of the various amendments of the Act, the most important are those effected by Act III of 1898 in regard to the preparation of the record of rights and the enhancement and reduction of rent, and by Act I of 1907which conferred greater authority on the record of rights when duly prepared and published, but the principles of the Act of 1885 remain unaltered and, with, the amending legislation, it provides a code governing the most important relations between landlord and tenant. It is in force in ten districts of Bihar. The three districts of Angul, Sambalpur and the Santal Parganas have special Tenancy Acts as have also, Chota Nagpur and the three coastal districts of Orissa. All these Acts provide for a record of rights.

It would be impossible and unprofitable within the limits of the present introduction to enumerate the tenures and sub-tenures intervening between the zamindar and the cultivating ryot which are regulated by this legislation. Suffice it to say that while the majority of the bigger estates remain in the possession of the old zamindari families, the landlords have freely used their powers of alienation not only to create subordinate tenures but also to transfer their estates, and that a considerable part of the area which was permanently settled in 1793 is no longer in the direct possession of the descendants of the original owners.

The temporarily settled tracts consist chiefly of territories acquired subsequent to the permanent settlement. Much the most important of them is the tract which constitutes the Orissa division but there are a number of estates held direct by Government in other divisions, of which the Khurda, Palamau, Banki and Angul estates are the principal ones. In 1925-26, 329 estates out of 118,907 were held direct by Government* and contributed thirteen per cent of the total land revenue. Purchases at revenue sales have gradually extended the temporarily settled areas.

The Orissa Tenancy Act of 1913 replaced for the three districts of Cuttack, Puri and Balasore, the Bengal Tenancy Act which had previously been in force. The object of the Act was identical with that of the Act it superseded, *viz.*, to regulate the relations between landlord and tenant.

* These estates directly held by Government constitute only a small fraction of the total number of estates subject to periodical settlement. In Orissa alone the number of these estates runs into several thousands and there are several hundreds scattered about the permanently settled tracts of Bihar.

Chota Nagpur also has a special Tenancy Act of its own (Act VI of 1908 and subsequent amendments). This Act not merely superseded the previous Acts in force in Chota Nagpur but introduced a number of principles adopted from the Bengal Tenancy Act and set the substantive law regarding the customary rights and usages of the aboriginal ryots on a firm basis. It has been successful in allaying the discontent which, as recently as 1900, manifested itself in an armed rising and has protected the rights of the aboriginal population where these have been endangered by the passage of the estates of indigenous landholders into the hands of ryots often of the moneylender class.

There is another Act peculiar to this part of the province (The Chota Nagpur Encumbered States Act VI of 1876 and subsequent amendments) which was enacted to protect the ancestral estates of the aboriginal landlords who have fallen into debt and to prevent them from being put up to sale.

Land Records and Survey.

A primary object of the framers of the permanent settlement of 1793 was to record all rights in land, but up to the passing of the Land Registration Act in 1876, the law as to registration was not strictly enforced. The object of the Act of 1876 was not to make an inquisition into titles, but to identify all individuals on whom might be imposed certain duties and obligations in virtue of their being in possession of land as proprietors. Consequently every person in possession of land, whether revenue-paying or revenue-free, is required to register full particulars. But such registration does not deal with subordinate rights and interests. For several years after the permanent settlement endeavours were made to maintain a record of these through subordinate officials but without success. At length, however, a procedure was devised under the Bengal Tenancy Act of 1885 for obtaining in a complete form a record of rights of all interests in the land. 1925-26 marked the completion of the record of rights for the whole of Bihar and Orissa, except for a few small isolated areas. The Administration Report of the province for that year observes that " It is difficult to exaggerate the benefit which these operations have brought to landlord and tenant alike, to say nothing of the general public and the administration of the province....District officers report, year by year, that the record is freely used...." The continued value of such a record is dependent on its being kept up to date by successive revisional operations.

4. THE CULTIVATOR.

Bihar and Orissa supports a population slightly larger than the population of England and Wales on an area nearly twice as large.

The total population of Bihar and Orissa, including the Feudatory States, as recorded at the census of 1921, was about 38 millions, of whom some four per cent only lived in towns. At this census, 81 centres of population were classified as towns, but six of these contained a population of under 5,000 and of the remainder no less than 35 have a population of between 5,000 and 10,000 only. The proportion of the urban to the rural population has remained practically stationary since 1891.

How predominantly rural Bihar and Orissa is, notwithstanding the existence of the industrial areas in Dhanbad and Singhbhum, is well illustrated by comparing the percentage of the urban population (3·7) with corresponding percentages for the neighbouring provinces. In the Central Provinces, the percentage is 9·0, in the United Provinces 10·6 and in Madras 12·4. There are, in fact, only four centres in Bihar and Orissa which can be termed cities, *viz.*, Patna, Gaya, Bhagalpur and Jamshedpur.

The total population in 1921 showed a slight decrease over the total returned in the census of 1911, which is accounted for mainly by the terrible visitation of influenza in 1918 which was aggravated by severe scarcity.

The population presses heavily on the land in North Bihar, where the mean density rises as high as 907,. 872 and 870 per square mile in the Muzaffarpur, Saran and Darbhanga districts, respectively. In the Patna district of South Bihar and the Cuttack district of Orissa also, the population is very dense, 763 and 565 per square mile. On the other hand, the Chota Nagpur plateau is thinly peopled, the mean density being 221 per square mile, and in the Angul district there are only 109 persons to the square mile. These figures are for British territory only. The sparsity of the population in the Chota Nagpur division brings Bihar and Orissa as a whole down to the third place among the provinces, below Bengal and the United Provinces.

Outside the towns, the people live in 104,239 villages and not in isolated houses on their holdings. The villages vary considerably in population. In Bihar, for example, where, as has been mentioned, the concentration of population is greater than anywhere else in India, 14,160 villages in the Tirhut division accommodate 9,688,892 people or an average population of 680 for a village, whereas in Chota Nagpur the average population of a village falls to 280. Village administration varies in the different parts of the province. In the permanently settled tracts of Bihar there is no village organisation, the real unit being the family, and the landlord and his agent take little interest in the general welfare of the village. In the aboriginal villages of the Chota Nagpur plateau, in the Santal Parganas and in the government estates in Orissa, on the other hand, the village headman is an official of real authority in the village, and manages all its relations with the outside world. In the Santal Parganas, this office is usually but not necessarily hereditary. But whatever the organisation of the village may be, it is generally true to say that there is usually no sanitation. Information regarding the health of the population will be found in the last section of this introduction under Public Health and Sanitation, and information in regard to village roads under Communications and Markets.

Holdings are small, but exhibit a good deal of variation in gross area. Thus, in the two most thickly populated districts of North Bihar, where the population is nearly 900 to the square mile, the average amount of cultivable land per household is estimated to be 5 acres, whereas in Chota Nagpur the average rises to $11\frac{3}{4}$ acres and in Orissa is 9 acres. If, however, account is taken of the fact that double cropping is the rule

rather than the exception in North Bihar, that in Chota Nagpur a large, and in Orissa a smaller but still substantial, proportion of the holding is not sown every year, the net or effective holding throughout Bihar and Orissa is uniform at something between six and seven acres. Fragmentation of these holdings is almost universal. It is worst in the Patna, Saran and Darbhanga districts of Bihar and in Orissa, where the average size of the 'fragments' into which the holdings are divided is no more than two-fifths of an acre and it will commonly take a cultivator an hour merely to go the round of all the fragments which comprise his holding. The waste of time and labour which is the most obvious evil of fragmentation is mitigated by the very general practice of combination among neighbouring cultivators to grow their crops in comparatively large blocks on a basis of payment in shares of the produce.

The actual cultivators of the land were estimated in the census of 1921 to number nearly ten millions and of these about one million were returned as having subsidiary occupations not obviously agricultural. These occupations include peddling, coal, iron and mica mining, weaving, smithery, carpentry and pottery, leather work, fishing and employment as general labourers.

The cultivation in the province varies greatly with the different races, climates and soils of the districts. The best cultivators are to be found in the Saran district of Bihar where the climate is good and the people intelligent, hardy and energetic. Pre-eminent among these are the *koeris* (vegetable gardeners).

The cultivation in Chota Nagpur is, throughout, very inferior to that in Bihar, although there are marked differences within the division itself. But the soil is generally too poor, the population too sparse and the attraction to the industrial centres in the division too great to make practicable even an approximation to the close and careful cultivation which prevails in North Bihar.

The cultivation in the Orissa division falls into two well marked divisions. In the west, in the Sambalpur district, conditions are similar to those in the Central Provinces. The cultivators are fairly prosperous, but the standard of cultivation does not reach so high a level as in Bihar, though it is greatly superior to the average cultivation in Chota Nagpur. In the east of the Orissa division, that is, in Orissa proper, the soil in the inland tracts is rich, the climate favourable and the cultivator intelligent. Excellent crops of rice are accordingly obtained in many parts of the district, and the evidence of good cultivation is seen in the ability of this part of the province to sustain a large population; in the district of Cuttack, the population reaches a density of 565 to the square mile.

This brief description takes no account of certain parts of the province where special conditions prevail, such as the Santal Parganas and the district round Ranchi where there are a fair number of aboriginals. The cultivation in these special districts varies considerably. In some parts, it is extremely good and in others it is little more than occasional cultivation of the jungle type.

Below the peasant cultivators come the landless labourers who number some $2\frac{3}{4}$ millions apart from their dependants. Wages are still moderate, though they have risen very considerably since the War, and the landless labourer is in consequence better off and more independent than he used to be.

In the reports on the last settlements of the Hazaribagh and Palamau districts of Chota Nagpur, unfavourable comment is made on the tendency for these landless labourers to become permanently attached to a master. In return for a loan received, such men bind themselves to perform whatever menial services may be required of them in lieu of paying interest on the loan and in consequence lose their status as free labourers.

Seasonal migration is a striking feature in North Bihar. It begins in November and is at its height after the winter rice crop has been reaped in December; the return begins about March-April. The migrants are often accompanied by their families. Crop cutting in northern Bengal is a special attraction for the family party, as the labour of the women and children is a useful asset. But trade, domestic and factory service, and day labouring and carting absorb many into Calcutta. Many others scatter all over Bengal often plying the business proper to their caste, as cobblers, boatmen, earthworkers, etc. Most of the coolies at the bigger railway stations of western Bengal come from Bihar and Orissa. South Bihar shares in this periodic migration as does also Orissa, migrants from these two areas going mostly to Calcutta. Chota Nagpur also sends large numbers to the coal fields and to the tea gardens in the Duars for periods of from two to six months.

Emigration of a more permanent nature takes place from all three divisions of the province—Bihar, Chota Nagpur and Orissa—largely to the tea gardens in the Duars and in Assam. Emigration from Chota Nagpur to Assam is specially marked, but it is not as a rule permanent, men and their families going for periods of from two to five years.

In the census of 1921, five per cent of the actual population of Bihar and Orissa, or nearly 2,000,000 were enumerated in other parts of India as having been born in the province. The census is taken at a time of year (March) when the seasonal migrants are just beginning to return. The census returns do not distinguish between seasonal migration and the longer periods of emigration. As compared with the census of 1911, emigration (which includes seasonal migration) in 1921 showed a decline in both North and South Bihar, but a very great increase in the case of Orissa which was doubtless a reflexion of the scarcity which occurred in Puri district in 1920. Emigration from the Chota Nagpur plateau had also greatly increased for similar reasons.

The factors which most affect the well-being of the rural population of Bihar and Orissa are, however, after all neither migration, nor access to industrial employment. Those employed in the iron and steel trade, in the 35 oil mills, the 22 tobacco factories and the 15 large sugar mills which the province maintains and the workers in the lac industry are an insignificant fraction of the total population. Agriculture remains

the sole means of livelihood for the greater part of the inhabitants of the province.

Factors of real importance to the cultivator are the sources from which he obtains the finance indispensable for carrying out his cultivation, and his ability intelligently to use that finance. At present, these sources of finance are the *mahajan* and the co-operative credit society. Government also provide facilities for borrowing under the Land Improvement Loans Act of 1883, but little use is made of these facilities. No estimate of the finance annually required to carry on cultivation in the province has, as yet, been made, but it is certain that it must amount to many crores of rupees. It is, therefore, equally clear that land improvement loans which amount on an average to Rs. 40,000 a year and the annual provision of 56 lakhs (the figure for 1925) from co-operative sources do not, between them, make any effective impression on the *mahajan's* monopoly.

If the spread of primary education is the essential preliminary to the wide extension of a sound co-operative credit system, as it is now in fact universally admitted to be, it is certain that education and a sound system of financing the growing and the harvesting of crops are both essential preliminaries to the improvement of marketing on any large scale. Unfortunately, there is still almost everything to do in spreading a knowledge of reading, writing and simple arithmetic among the people. In the census of 1921, only 12·6 of the men and 0·7 per cent of the women of twenty years of age and over were returned as literate and, although literacy had increased to some extent since the census of 1911*, the rate of increase clearly allows no hope whatever of any early general attainment of literacy. The position in regard to literacy is further dealt with in the section on Education below.

5. THE AGRICULTURAL DEPARTMENT.

Since the closing of the Agricultural College at Sabour in 1923, there has been no educational centre in Bihar and Orissa at which the research and experimental work of the Agricultural Department could be prosecuted. The Director of Agriculture has his headquarters at Sabour where one of the five central experimental farms of the province is situated. Here also the botanical and chemical work of the department is carried out under the supervision of the Director and the agricultural engineer is stationed.

The general agricultural policy in the province since 1923 has been one of decentralisation and, for administrative purposes, the province is divided into four ranges, North Bihar, South Bihar, Chota Nagpur and Orissa, each under a deputy director. North Bihar and South Bihar have, however, been found to be too big for a single deputy director's charge and the eastern sections of each of these two ranges have, therefore,

*Literate	1911		1921	
(aged 20 and over)	Males	Females	Males	Females
	11·4	·4	12·6	·7

been placed under an assistant director responsible to the Director. It is contemplated ultimately to have seven ranges and the administrative approval of Government has already been obtained to the establishment of a fifth range for the Santal Parganas in south-east Bihar.

These arrangements are the outcome of the report of an agricultural committee in 1922 which was chiefly composed of members of the Legislative Council and included the Agricultural Adviser to the Government of India. The committee was convened in consequence of the attitude of the legislature towards a scheme for reorganising the department which included the retention of the Agricultural College at Sabour, the development of farms and the establishment of a sugarcane station in North Bihar.

The organisation within each range is based on a central experimental farm. These farms are at Sepaya (379 acres) for North Bihar, Sabour (190 acres) and Gaya (193 acres) for South Bihar, Ranchi (340 acres) for Chota Nagpur and Cuttack (150 acres) for Orissa. Of these, the Cuttack farm, which was started in 1904, is the oldest; the farm at Sabour dates from 1906, the Sepaya and Ranchi farms from 1913-14 and the Gaya farm from 1924. The ranges are necessarily of very considerable extent. The Chota Nagpur range is, for example, 200 miles from north to south and east to west, and if the other ranges are less extensive, the population is far greater. An organisation confined to one farm could not in such circumstances distribute in an effective manner the results of its research work among the cultivators and the agricultural committee of 1922 accordingly recommended the establishment of a small farm in each of the sixty-four sub-divisions as a centre for disseminating improvements in that area. Eight such farms already existed at the date of the committee's report, *viz.*: Jamui and Nawadah in South Bihar; Purulia, Ramgarh and Netarhat in Chota Nagpur; and Sambalpur, Balasore and Khurda in Orissa. Since that date, seven more sub-divisional farms have been started; Sewan and Darbhanga in North Bihar; Birkamganj and Siris in South Bihar; Chaibasa in Chota Nagpur; and Anandpur and Angul in Orissa. With fifteen sub-divisional farms started and three more under construction out of a programme for sixty-four there is clearly much to be done. The proposed provision for five more farms had to be omitted from the budget of 1927-28 owing to lack of funds. The farms vary in size but, with the exception of Netarhat and Nawadah, all of them are under 50 acres. The area of the Netarhat farm is 193 acres and that of Nawadah 67 acres.

While the organisation of the department is thus based on these farms, the methods of work adopted in the different ranges are not quite uniform. In Bihar, where farms are still very few and the cultivation very close, experiments are made on cultivators' fields and there is widespread propaganda, in which the co-operative movement takes its share, based on the results. In Orissa, the five sub-divisional farms provide a surer basis for demonstration on a similar scale and by similar means. In Chota Nagpur, where the area is large, there has been as yet very little propaganda and the sub-divisional farms are only four in number; a start has, however, now been made with propaganda in this area.

The staff of the department consists of officers of the Imperial Agricultural Service, recruitment for which has now ceased, officers of the Provincial Agricultural Service and the Subordinate Service. There are five Imperial Agricultural Service officers, the Director and four deputy directors in charge of the four ranges, and an agricultural engineer recruited on a temporary agreement. There are ten Provincial Service officers; of these six are assistant directors, two of whom are in independent charge of the east-south and east-north Bihar ranges under the Director of Agriculture and four work as assistants to the deputy directors. Of the remaining four provincial officers, two are agricultural chemists, one is an assistant professor of mycology officiating as economic botanist and the fourth is superintendent of the Monghyr dairy farm. The Subordinate Service is divided into three grades, a small upper grade on Rs. 150—10—200, with two posts on Rs. 225 and one on Rs. 250 consisting of managers of the central farms and probationers for the Provincial Service, a middle grade on Rs. 60—5—150 and a lower grade on Rs. 30—2—60—4—100. Recruits who have passed the intermediate university standard start on Rs. 45 and ordinary matriculates start on Rs. 35. Staff is undoubtedly the greatest difficulty at present in the way of developing the activities of the Agricultural Department. There is now no agricultural chemist or economic botanist belonging to the Imperial Agricultural Service. The work of the agricultural chemist is now being done by the former assistant professor of chemistry and that of the economic botanist by the former assistant professor of mycology at the Sabour College. Both these officers worked under the supervision of the Director. All entomological and mycological problems have to be referred to Pusa. The Government of Bihar and Orissa propose to make provision for an agricultural chemist and an economic botanist in the new Superior Provincial Service which is to replace the Imperial Agricultural Service, but it is intended to continue to rely on Pusa in the sphere of entomology and mycology. As regards provincial staff, the intention at present is to recruit men who have taken degrees with honours in science from the universities and to give them a practical agricultural training at the central farms at Sabour, Cuttack, Ranchi and Sepaya under the deputy directors. A graduate who took honours in science at the University of Patna was recruited in this way in 1924. The subordinate staff are trained on the agricultural farms, mainly at the four central farms, but training in agriculture is necessarily slow, and the work at the central and existing sub-divisional farms is being carried on under serious disabilities, so much so that the Director in his report for 1925-26 stated that it had become "necessary to check the expansion of the work outside the central and existing sub-divisional farms in order to give more attention to the training of the subordinate staff on these farms and to the work in progress on them."

The work done on crops by the Agricultural Department for the cultivator may best be shown by a brief summary of the principal activities of the four central farms;

Sabour.—Here the crops under study are chiefly sugarcane, potatoes and vegetables. The farm is run by recruits on probation. The installation of two tube wells in addition to percolation wells enables the greater part of the farm to be irrigated.

Cuttack.—Although the work of the department has been longer established here than elsewhere in the province, the only considerable success so far attained has been with paddy. The seed of two prolific and early yielding varieties and one prolific and late yielding variety is now in process of distribution. Ten thousand pounds of seed were distributed free by co-operative societies in 1925-26 for demonstration purposes. Green manuring has also spread in the Orissa delta. Of one important problem in the delta, *viz.*, the crops which can best be grown in the cold weather on land where paddy has been destroyed by floods, no decisive solution has been found but the experiments with linseed and *juar* are hopeful.

Ranchi.—Apart from cattle breeding which will be described later, the work on this farm and the small sub-divisional farms linked with it consists chiefly in varietal experiments with paddy and the growing of groundnuts for distribution and of sugarcane on drained paddy land for experimental and demonstration purposes.

Sepaya.—Apart from cattle breeding, useful work is being done in popularising Coimbatore cane No. 210, while tobacco growing experiments have resulted in the rapid spread of the crop in the Saran district where it was almost unknown before.

The greatest success so far achieved with the introduction of an improved variety is not, however, connected with any one farm. It is the introduction of *dahia* paddy, which is an early and heavy yielder, and by 1924-25 had spread over about 23,000 acres in South Bhagalpur, South Monghyr and the Santal Parganas in South-East Bihar. The cultivation of groundnut has also been taken up on a considerable scale in the Patna division as the result of departmental demonstration.

Attention is being paid in all four ranges to manuring; in particular, the use of gypsum has been introduced on a considerable scale in South Bihar. Experiments are also being conducted on the farms to determine the value of different types of phosphatic manure and the possibility of a great demand in the near future for this and other kinds of fertilisers is foreseen as the result of the tests already made by the Agricultural Department and of the organised propaganda which has now been begun by sellers of artificial manures on the basis of these tests.

Important experiments have also begun at the Purnea* farm in North-East Bihar into the relative values of different varieties of jute for local cropping.

Agricultural engineering.—The Agricultural Engineer has a workshop at Sabour which is also his headquarters. Research on water lifts is

* This farm of 190 acres is privately owned, by the Tournament Trust Committee, but is controlled by the department.

conducted there and there is so great a demand for the Rahat pumps (iron Persian wheels) that arrangements are being made to have them manufactured by private firms, as the workshop cannot meet the demand and it is also hoped that manufacture by private agency will enable the pump to be sold cheaper. Repairs to farm implements, machinery and boring plant are also carried out at the workshop at which, as far as possible, all boring appliances are also manufactured. Experiments are also being made with *gur* furnaces and cane mills. But the main duty of the Agricultural Engineer is well boring. There is a considerable demand from cultivators for borings in ordinary wells and orders for tube wells with strainers are now being received. There were in all 215 such applications in 1925-26. The staff of the Agricultural Engineer has been strengthened by the appointment of an assistant engineer and three separate sections have been constituted for the three alluvial tracts, each under a supervisor, *viz.*, one in North and one in South Bihar and a third in Orissa.

The Agricultural Engineer is also responsible for small *bunds* in South Bhagalpur division. A typical scheme is the one carried out at Koilwa in 1925-26 which will control 200 acres. These *bunds* combined with drainage are of especial importance in Chota Nagpur. It is, as the Report of the Agricultural Department for 1925-26 remarks, "the one direction in which a really great advance seems possible in Chota Nagpur—the retention of the monsoon rainfall at a high elevation above the paddy land and the drainage of the lowest paddy land for sugarcane and garden crops."

6. LIVESTOCK WORK AND THE VETERINARY DEPARTMENT.

Both oxen and buffaloes, especially the former, are a very important feature of agriculture in Bihar and Orissa, as not only are they required in large numbers for agricultural operations within the province but, with the assistance derived from the neighbouring pastures of Nepal, there is a large annual export to Bengal. A comparison of the census of 1920 with that of 1925 yields the following results :—

	1920	1925	Increase or decrease
Bullocks	6,256,310	6,826,415	570,105
Cows	5,617,449	5,751,480	134,031
Young stock	4,482,405	4,653,065	170,660
Male buffaloes	802,570	826,599	24,029
Cow „	1,515,301	1,555,441	40,140
Young stock	1,038,168	1,022,221	— 15,947
	19,712,203	20,635,221	923,018

Various attempts have been made in the past, notably at the Sepaya farm, to improve the breeds of cattle, but so far with little result. Continuity of policy has been lacking and as the distribution of bulls and male buffaloes has been made on no settled plan, any good that might

have been effected has been dissipated. Although dairy herds have been maintained at the Sabour and Ranchi farms and a third herd has recently been established at the Monghyr farm on the advice of the Agricultural Committee of 1922, nothing has been done to improve draught cattle since the abolition of the breeding herd at Sepaya in 1922. A cattle committee was appointed in 1925 to consider the state of cattle breeding in the province generally. The committee reported in favour of breeding a dual purpose animal and their recommendations that a large breeding farm should be established at Patna under the Veterinary Department, that a breeding herd should be attached to the Cuttack farm in Orissa and that a herd of Murra buffaloes should be maintained at Sepaya farm have all been approved. The Veterinary Department will, therefore, henceforward, have an interest in breeding. Hitherto, breeding operations have been entirely conducted by the Agricultural Department, but the local Government are now disposed to think that livestock and dairying work should be brought as far as possible under the control of the Veterinary Department and they have decided that the present Director, Civil Veterinary Department, should combine the duties of livestock officer with that of director. Sheep and goats are both important elements in the livestock of the province, numbering, as they do, 1,239,000 and 5,765,000 respectively, but so far no attempt has been made to improve their breeds.

The Civil Veterinary Department was separated from the Agricultural Department in 1920. For the purpose of administration, the whole province is divided into three ranges, North, Central and South. The first is in charge of a deputy director, who, like the Director, is a member of the Imperial Veterinary Service, recruitment for which has now ceased. The third was also in charge of an officer of the Imperial Veterinary Service but the vacancy which arose on his death has been filled by the appointment of an officer of the Provincial Veterinary Service. As the Director has now taken up the additional duty of livestock officer, it is necessary to relieve him of the Central range which is at present under his direct charge and to appoint a third deputy director. At present, there are only three officers in the Bihar and Orissa Provincial Veterinary Service, two assistant directors on Rs. 250—50—750 per month and an officer who, after obtaining a veterinary degree in England, is now taking a post-graduate course at Muktesar and has been appointed temporarily for a year on a special rate of pay of Rs. 300 per month pending a decision as to the formation of the new Superior Provincial Service to take the place of the Imperial Veterinary Service.

Owing to the comparatively recent origin of the department and the shortage of staff, its activities have in the past been chiefly concentrated on the control of contagious diseases. The charge of the new breeding centre at Patna and still more the decision to create a veterinary college, with its opportunities for prosecuting research, will greatly widen its outlook. At present, any investigation beyond the resources of the three small laboratories, one for each range, has to be referred to Muktesar.

Hitherto, the subordinate veterinary officers have been trained at the Bengal Veterinary College. The new college, which will be at Patna, will be run in connection with the proposed cattle breeding and dairy farm there. The students will thus have an opportunity of getting an insight into animal husbandry and dairying which no other veterinary college in India provides. It is intended to start with a three years' course only, in view of present financial conditions, but the advantages of a four years' course and of affiliation to Patna University which the extra year will make possible will not be lost sight of. The college will not supply recruits for the new Superior Provincial Veterinary Service. The intention at present is to obtain these recruits from among students sent to England who return with a veterinary degree.

The subordinate staff consists of 124 veterinary assistant surgeons, 13 inspectors of the work of these assistants, 18 staff and reserve inspectors, 4 laboratory assistants and 1 cruelty inspector employed by the Patna Municipality. The veterinary assistant surgeons are on a scale of Rs. 50—10—125 with certain allowances; three of the laboratory assistants receive Rs. 100-125 per month and the fourth is on Rs. 60-80 per month. The cruelty inspector is on a special scale of Rs. 100 per month and is appointed temporarily for three years in the first instance.

The veterinary assistants are government servants but work under the district boards. They are paid by Government, the district boards making a contribution to Government in respect of their pay (five-sixths in the case of the stationary and one-half in the case of the touring assistants). The assistants are partly touring and partly stationary. The intention is to have one fixed hospital, in charge of an assistant in each sub-division and two touring assistants. As there are 63 sub-divisions and only 27 stationary and 97 touring assistants, the staff is by no means complete, but many district boards are reported to be genuinely unable to do more than they do at present. But undoubtedly the proportion of their expenditure on veterinary matters to their total receipts and to their expenditure on education and medicine is disappointingly low. Thus, no district board in 1925-26 spent more than two per cent of its total receipts on veterinary work (including the cost of sera and vaccine) and no fewer than nine out of the twenty boards which sent in returns spent less than one per cent. On education, on the other hand, no board spent less than ten per cent or on medicine less than four per cent of its total receipts.

Inoculation against rinderpest, hæmorrhagic septicæmia, anthrax and black quarter are carried out. In 1926-27, the total inoculations were 147,731 and in the preceding year, 170,153. The marked difference between the two years was due to the abnormally low incidence of rinderpest in 1926-27. Inoculation by the simultaneous method has not so far been employed. In 1926-27, 3,915 in-cases and 42,421 out-patients were treated in the veterinary hospitals. In the same year, the travelling dispensaries performed 1,119 castrations and treated 38,821 animals for contagious, and 69,247 animals for non-contagious, diseases.

7. IRRIGATION.

In 1926-27, the area irrigated from all sources amounted to 5,301,835 acres, or about eighteen per cent of the total area sown. Of this area, no less than 3,584,000 acres were under rice and practically all the remaining acreage irrigated was under foodcrops of one kind or another.

The sources of irrigation are various ; 1,832,576 acres are irrigated by canals nearly half of which are privately owned, 1,591,171 acres and 620,197 acres are irrigated by tanks and wells respectively and 1,257,391 acres derive their water from various sources, the chief of which is the impounding of flood water by temporary bunds.

The major part of the large area irrigated by private owned works is situated in the Gaya district and in the southern portion of the Patna district. These irrigation works are maintained by the landlords, and, as a rule, the rents are paid in kind and not in cash. This brings in a large return to the landlord on the capital which he expends on irrigation. The tenants as a class tend to apply for a commutation of their produce rents into cash rents. This commutation it is within the power of Government to grant. But Government have to consider that the tenants owing to their inability to combine among themselves are, as a class, unable to keep up the irrigation works, so that general commutation throughout the district would result in extensive deterioration in cultivation.

The government canals are in the north and south-east of the province. In the north are the Son, Tribeni, Dhaka and Teur canals ; in the south-east are the Orissa canals and the Orissa Coast Canal, the latter being for navigation only. There is a separate department for irrigation with a Secretary who is also Chief Engineer at the head of it. There are two local circles of administration—the Son and Orissa, each in charge of a superintending engineer.

The Son canals, which were opened in 1875, take off in two main branches from the river Son, one on the east and one on the west bank of the river. They irrigate an average area of 564,441 acres on the south bank of the Ganges at a capital outlay per acre irrigated of Rs. 48. The interest earned averaged 5·89 per cent for the three years ending 1925-26. The Tribeni, Teur and Dhaka canals all lie to the north of the Ganges and close to the Nepal boundary. The Tribeni Canal was completed in 1912 and irrigates 66,588 acres from the river Gandak at a capital outlay per acre irrigated of Rs. 122. The revenue earned averaged only 0·62 per cent on this outlay for the three years ending 1925-26. The Dhaka Canal was opened in 1907 and provides water for 14,345 acres at a capital outlay of Rs. 42 per acre irrigated and gave a return of 1·01 per cent over the same period. The Teur Canal irrigates an average area of just over 2,000 acres. It was originally a private irrigation system. Both the Tribeni and the Dhaka canals were constructed as protective works.

The Orissa canals in the south-east date from 1865. Their main function is to protect portions of the Mahanadi delta against flooding.

The area protected is 562,114 acres and the cost Rs. 48 per acre. The average area irrigated is only 247,224 acres. For the three years ending 1925-26, these canals returned only 0·48 per cent as interest on capital outlay.

On all these canals, the cultivator is charged for water on an acreage basis and he can enter into a long term lease at reduced rates or pay for the water by the season and the crop. The details of the arrangements for long leases differ for the different canals, but in no case does the lease cover watering for the whole year. In the case of the Orissa and Son canals it covers watering from June to March. Waterings required in April, May and part of June for such crops as sugarcane, cotton, indigo have to be paid for as extras. On the Orissa canals only some 260 acres are not irrigated on the long lease system. Two-thirds of the acreage irrigated by the Son Canal and nearly one-half of the acreage irrigated by the Dhaka Canal are under this system. Long leases are less popular on the Tribeni Canal and cover only three-tenths of the area irrigated. The long lease system shows signs of falling into disfavour on the Son canals.

No schemes for new canals are under consideration and, as will have been remarked, there has been no construction since 1912. Extensive additions could advantageously be made to the areas irrigated in Bihar north of the Ganges and such works would incidentally be of service in drainage but there is little likelihood of development as the head waters of all available rivers lie within Nepal and the necessary control is, therefore, lacking.

The Son and Orissa main canals are open to navigation. Including the Orissa Coast Canal, there are 500 miles of navigable canals in the province.

Of the total area under tanks (1,591,000 acres) and wells (620,197 acres) more than one-half in each case is located in the Patna division.

Wells are a great feature in the cultivation of South Bihar. In this district, the rainfall is too light to admit of rice cultivation on an important scale but wells make it possible to grow vegetables (including potatoes and onions) and spices. Well irrigation is also utilised for sugarcane and even for wheat. It has been found that the supply from a percolation well can often be greatly increased by driving a 3" tube into lower water bearing strata. There is a demand for these borings and an even greater demand from zamindars and others for tube wells proper. The engineering section of the Agricultural Department has recently acquired plant for making tube wells. Well irrigation is not as yet practised in Orissa, though a demand for tube wells is now arising and the Agricultural Department have posted a well boring supervisor to this area. Well irrigation is practised in Chota Nagpur but is unimportant. Where well irrigation is practised on such an extensive scale as it already is in the Patna and Tirhut divisions, the efficiency of water lift appliances becomes important and there is an increasing demand for iron Persian water wheels.

Outside the Patna division, the largest area irrigated by tanks lies within the Chota Nagpur plateau. The future expansion of irrigation

in the province undoubtedly lies with small schemes and, more particularly, with wells, the responsibility for which rests with the Agricultural Department. The engineering section of that department has recently been reorganised and the field work distributed into three sections, North Bihar, South Bihar and Orissa. The iron Persian wheel is being adapted at Sabour to meet local requirements in the way of water lift as motor water lift is not considered economical where the capacity of the well is less than 12,000 gallons a day.

River conservancy is confined to the Ganges and is devoted to keeping the river open for navigation during the period of low water from October to May.

8. FORESTRY IN RELATION TO AGRICULTURE.

7,514,743 acres are shown in the Season and Crop Report for 1926-27 as under forests. Of this area, only 2,373,533 acres are under the management of the Forest Department. The forest areas are situated chiefly in the Chota Nagpur division, in the Angul, Puri and Sambalpur districts of Orissa, in the Santal Parganas and in the Champaran district of the Tirhut division.

In 1925-26, grazing was provided in the forests under State management for—

62,100 buffaloes,
281,654 cows and bullocks,
55,980 sheep and goats,
10 camels,
10 other animals.

This is, of course, the merest fraction of the total livestock of the province, since the total number of cattle alone in Bihar and Orissa is estimated at 21 millions. The value of free grazing or grazing at reduced rates was, in 1925-26, Rs. 1,09,693. In the same year persons with rights in the forests took away forest produce valued at Rs. 1,50,078. The total grazing and forest concessions in 1925-26 were, therefore, valued at Rs. 2,59,771.

9. GENERAL EDUCATION.

The total expenditure on education at recognised institutions in the province in 1925-26 was 153 lakhs of rupees as compared with 114 lakhs in 1920-21 and 63 lakhs in 1912-13. Of the expenditure in 1925-26, 37·60 was contributed by Government, 28·50 came from funds of the local boards, 19·20 from fees, and 14·70 from other sources such as endowments and private subscriptions. The cost per enrolled student was Rs. 10-8-11. The average cost per pupil at different types of institutions is stated in the table of figures given below.

In 1926, there was in Bihar and Orissa excluding the Feudatory States a population of some 16,765,000 males and 17,239,000 females. Of the former 964,288 or 5·75 per cent and of the latter 120,091 or 0·69 per cent were under instruction.

Of the male pupils, about 925,600 were attending institutions recognised by the Education Department. In the following table are given particulars of the institutions for males, scholars in attendance and cost per head of each pupil :—

Kind and number of Institutions	Number of pupils	Percentage at each Institution	Cost per pupil
			Rs. a. p.
1 University..	....	....	....
9 Arts Colleges	3,211	0·33	277 15 1
5 Professional Colleges	887	0·09	452 8 5
130 High Schools	35,108	3·63	46 4 3
516 Middle Schools	51,662	5·34	20 14 0
27,689*Primary Schools	861,172	89·00	5 9 10
452 Special Schools	15,567	1·61	87 7 4

*Includes 1,007 night schools.

The University of Patna, which was founded in 1917, is of the examining type. In Bihar and Orissa, as elsewhere, the recommendations of the Calcutta University Commission of 1917 attracted widespread interest in educational circles. The provision of facilities for education up to the intermediate standard before the student proceeds to the degree stage has taken the form of adding in preference to that of two additional classes to certain high schools and not by establishing Intermediate colleges.

An important step in the education of the medical and health services of the province was taken in July 1925, when the Prince of Wales Medical College was opened. The college teaches up to the M.B.,B.S. standard and a Faculty of Medicine has been added to Patna University.

The policy of Government in regard to high schools is to maintain one such school in each district in order to set an example to high schools maintained by private agency. At present, Government have 24 such schools. All government schools will teach elementary science and also manual training. Drawing is already compulsory.

In this policy and in other plans for improving secondary education, the Government receive assistance from the Board of Secondary Education, the chairman of which is the Director of Public Instruction. All educational interests, from the university downwards, are fully represented on the board which includes a representative of female education. The board meets three times a year.

English is taught in 283 of the 516 middle schools. Almost all the 233 vernacular schools and most of the 283 English schools are now under the control of district boards and municipalities. There is a tendency for vernacular schools to develop into English schools. There is a distinct cleavage of opinion in regard to this tendency. The demand of public men and many experienced teachers is for education in the vernacular at least up to the matriculation stage, and in response to this demand

experiments are being made in using the vernacular as the medium of instruction in the upper classes of high schools. Parents on the other hand almost invariably desire their children to be taught English as soon as possible.

No specific instruction in agriculture has so far been given in secondary schools, but an experiment is about to be tried of attaching to certain schools a garden of about one-quarter of an acre. A teacher from each of the selected schools will be sent for a short course of training under the supervision of the Director of Agriculture at Sabour. Teachers will be encouraged to associate the work done in the garden with the teaching of other subjects.

Illiteracy is as great a problem in Bihar and Orissa as in other parts of India. The percentage of literates of 20 years of age and over returned in the census of 1921 was 12·6 for males and 0·7 for females. The steps that must be taken to improve the position in regard to males are known, *viz.*, improvement in the quality of teaching, the stoppage of wastage after the completion of the first year at the primary school and the bringing of the total boy population under instruction. As regards the quality of teaching, the pay of teachers in vernacular middle schools and in primary schools is very low, ranging as it does from Rs. 30 to Rs. 50 in a middle school for a certificated teacher to Rs. 5 rising to Rs. 10 for an untrained teacher in a primary school. As regards wastage the fact that in 1925-26, seventy-eight per cent of the pupils in all schools (primary and secondary) were in the two lowest classes of the primary schools speaks for itself. As regards the third point, there has, it is true, been a rapid increase under the present voluntary system in the number of boys attending school—some 159,000 in the three years 1923-24—1925-26 but the percentage of boys of school-going age actually at school is still only 39·1.

An exhaustive investigation into the whole situation in regard to primary education was made by Government in 1925. It was based on programmes for the education of eighty per cent of the male school-going population submitted by local authorities. Orders were issued separately on each programme in accordance with certain general principles as to the action to be taken, chief among which is the abolition as soon as possible of the single teacher school and direct management by each district board of the primary schools in its area except where really satisfactory local committees can be formed. The extra expenditure in carrying out all the programmes was estimated to amount to Rs. 74 lakhs. Free education in the lower primary stage would cost another Rs. 19½ lakhs. Owing to the difficulty of finding funds for this heavy increase in expenditure, the Government had to decide in 1925 against the introduction of any comprehensive scheme of compulsion in rural areas although the necessary statutory provision for this already exists under the provisions of the Act passed in 1919. Certain local bodies are, however, anxious to try the experiment of compulsion in limited areas and the Government have stated that they will be prepared to consider sympathetically any proposals to this end, the more especially as such experiments should be valuable for future guidance. So far, one rural

area only has introduced compulsion, the Banki Union in Cuttack. It is too early yet to draw any conclusions from this experiment. Three more rural areas have begun recently to introduce compulsory primary education, but it is not yet effective.

In addition to the ordinary primary schools, there were, in 1925-26, 1,007 night schools for males with an attendance of 21,701 pupils. The co-operative organisation is not specially identified with the movement for adult education, but it is in a special way identified with a forward policy in education as it is expected of co-operative banks and unions that they shall foster primary education in the areas in which they operate. The attention of the local authorities has again been drawn by the Government, as part of their orders on the 1925 programmes referred to above, to the advantages to be derived from making block grants to these banks and unions in view of the opportunities which they possess through the local co-operative officials for supervising the proper expenditure of such grants.

Female education in Bihar and Orissa, as elsewhere, presents very special problems and, as the figure of literacy returned at the 1921 census all too clearly shows, the results so far have been meagre. Moreover, over ninety per cent of the 120,091 girls who, in 1925-26, attended some place of instruction were in primary classes and with the wastage prevalent in these classes comparatively few of these pupils can be expected to become literate. There has been an unfortunate period of actual retrogression in the movement for female education in the province from which recovery is only now being made. A special enquiry was made into the cause of this but no more tangible reason for the decline in the number of girls attending educational institutions could be discovered which at no time has been large than the complete indifference of both men and women to the education of their daughters. However within the last two years the figures of attendance have risen and now exceed the previous maximum which was reached in 1915-16. Expenditure by local boards on girls' schools is also showing an upward tendency and the supply of trained teachers, though still far short of the demand, is steadily increasing. These are encouraging signs, but with an attendance figure which still only amounts to 4·6 of the total number of girls of school-going age in the province, it is obvious that almost everything still remains to do.

10. CO-OPERATION.

At the end of 1925, there were 6,608 credit agricultural societies, 86 of which were on a limited liability basis. The total membership of 177,136 gives an average of 27 only for each society. In 1912, there were 491 agricultural societies and 39 non-agricultural societies with a total membership of 27,207 or an average of 51 persons for each society.

The total working capital of the agricultural societies at the end of 1925 amounted to Rs. 1,62,64,536 : to this amount share capital contributed 4·5 per cent and deposits five lakhs or 3·1 per cent of which over three lakhs represented deposits by members in their societies. The reserve fund amounted to seventeen lakhs or 10·5 per cent. The bulk of the working capital was borrowed from provincial or central banks,

advances from which at the end of the year amounted to Rs. 133 lakhs or eighty-two per cent of the total working capital of the societies. The amount borrowed from Government was practically negligible, the outstandings at the end of the year being only Rs. 114. Fifty-six lakhs were given out to members in loans during 1925. The average loan worked out to Rs. 32 a head. Thirty per cent of the loans were in relief of debt and only forty-three per cent can be described as given for productive purposes. As much as thirteen per cent was borrowed for payment of rent (three rent-paying societies having just been started) and four per cent was lent to defray the cost of marriage and other ceremonies.

The movement is especially strong in South Bihar, around Ranchi and in the Cuttack and Puri districts of the Orissa division. It has gained no foothold in the Feudatory States. Elsewhere it is fairly well represented in every part of the province except in the south part of the Chota Nagpur division and the Santal Parganas where it is very weak.

Government exercise a general supervision over the movement through the Co-operative Department which consists of one registrar, one deputy registrar and nine assistant registrars and one chief auditor. The actual audit is carried out by the Bihar and Orissa Co-operative Federation which is subsidised by Government and employs a staff of seven divisional auditors each in charge of a circle and seventy-one local auditors. The aim is to audit each society once a year. Test audits are also carried out by the nine assistant registrars and the divisional auditors. The classification of the 5,403 societies audited in 1925 was as follows :—

A (model)	..	5 per cent.
B (good)	..	15 ,,
C (average)	..	68 ,,
D (bad)	..	10·3 ,,
E (hopeless)	..	1·7 ,,

At present there are 198 guarantee unions to which 1,684 primary societies are affiliated.

In addition to audit, the federation makes itself responsible for training managers, local auditors, inspecting and bank clerks, etc. It employs a development officer who is responsible for propaganda and the production of the Federation Gazette. The federation draws its funds for these and other purposes mainly from the societies, but Government also makes a contribution. The federation holds an annual congress.

A divisional board has been set up in each of the five civil divisions to act as a centre of co-operative activity. On the average, two meetings a year are held for discussions, etc.

The fifty-eight central banks keep in close touch with the Agricultural Department and introduce new and profitable crops—eighteen banks in 1925 promoted the extension of groundnut cultivation and fifteen interested themselves in the spread of sugarcane cultivation. Ploughs and sugarcane crushers are bought and it has recently been decided on the advice of the Government Development Board* that these banks can

*This board advises Government on important questions concerning the departments in charge of the members of the board, *viz.*, the Agricultural, Industries, Civil Veterinary, Co-operative and Forest departments.

properly take up the purchase of manures. Grants are obtained from district boards for the development of agriculture and the promotion of primary education. In times of epidemics the banks employ doctors and distribute medicines to primary societies.

At the apex of the credit side of the movement stands the Provincial Bank, which has a working capital of Rs. 47 lakhs and made a profit of over Rs. 40,000 in 1925. It has an overdraft of Rs. 2,85,000 with the Imperial Bank against government securities.

Societies formed specifically for purchase and sale are unimportant. There are, however, eighty-four grain storage societies (*golas*) with a total membership of 22,410 which, together with the two central grain banks started at Sambalpur and Bargarh, made a net profit in 1925 of over Rs. 12,000. Their object is to give loans of paddy to their members at reasonable rates and to create a reserve stock of paddy for use in times of scarcity and famine.

There is only one dairy society—the Mayaganj Goala Society. It is making a profit, but its operations are unimportant.

11. COMMUNICATIONS AND MARKETING.

Three main line railways pass through Bihar and Orissa—the Bengal and North-Western Railway in North Bihar, the East Indian in South Bihar and the Bengal Nagpur Railway in Chota Nagpur and Orissa. The mileage has increased from about 3,000 miles in 1911-12 to about 3,500 at the present time. Recently, lines of great importance to the coal fields of the province have been constructed or sanctioned for construction—notably the Central India Coal Fields Railway, the Chandil Barkakhana Chord, which will open up the Karanpura field, and a line linking the Talcher field to the Bengal Nagpur main line to Madras. Except in the south of the province, where the Feudatory States have yet to be opened up, the railway communications of the province are good, when due allowance is made for conditions in the hilly tract of Chota Nagpur.

There are over 28,000 miles of roads, of which 3,600 are metalled and 24,600 unmetalled. Local authorities are responsible for some 26,000 miles of these roads. The Grand Trunk road and the Orissa Trunk road and other arterial communications are in charge of the Public Works Department. The Grand Trunk road is the great thoroughfare for cattle from up-country.

The district boards spend about one-third of their income. The Government do not ordinarily make grants to the boards for public works, although such grants are freely given for the expansion of education and of the medical services and for the improvement of sanitation. A rough track which is apt to be under water during the monsoon if the village site is low lying, or a water course if it is not, connects the village with the nearest district board road. But during the dry season from December to June these tracks are as a rule quite passable for bullock transport.

A very large proportion of the foodstuffs, grown especially in the rice growing tracts, is consumed locally. Bihar imports from Nepal and in

the Chota Nagpur division also there is always a net import. The Orissa division alone has always a surplus. The net export of foodstuffs is, therefore, not large. Where it takes place, the cultivator usually disposes of the grain on the threshing floor to a middleman, if he is in a small way. If he is a bigger man or of the landlord class, he may both store and subsequently market his surplus but very often even the bigger men will have disposed of their grain direct to some big exporting agency which may be financing them. Each village will usually have one large cultivator who stores more grain than he requires and will lend it out if there is a shortage of seed at sowing time.

Among the regular exports, oil-seeds, sugar, tobacco, jute and other fibres and lac are the most important. Vegetables and fruit are exported to Bengal and the United Provinces and the trade in *ghi* is considerable.

For the disposal of these products (except fruit and vegetables which find their way direct to the railway) as well as for general local trade there are 432 principal and 2,464 minor markets which are maintained by the landlords or their lessees, the cost being met by tolls or a rent charge. The frequency of these markets (they are held once or twice a week) and the fact that the cultivator is seldom more than from five to six miles from a market and is usually much nearer are noteworthy. There is a brisk trade in cattle, especially in buffalo bullocks, at the big cattle fairs. There is also a large trade in these buffalo bullocks between Bihar, where milch buffaloes are kept in great numbers, and Chota Nagpur where the home bred cattle tend to become too small for local cultivation requirements owing partly to deficiencies of bone growing material in the soil and partly to the pressure of the cattle population on the available grazing areas. There is also a considerable export, chiefly to Bengal, of bullocks and cows from Bihar.

12. LOCAL SELF-GOVERNMENT.

Provincial government in Bihar and Orissa is on the same pattern as in other Indian provinces. The Governor acting with two Ministers administers the "transferred" departments, *viz.*, Education, Agriculture, Veterinary, Industries, Co-operative Societies, Registration, Local Self-Government, Medical, Public Health, Excise, and Roads and Buildings. The "reserved" subjects are dealt with by the Governor acting with two Members of his Executive Council.

Local self-government in rural areas within the province is regulated by the Bihar and Orissa Local Self-Government Act of 1885 with subsequent amendments and the Village Administration Act of 1922.* The various local authorities are (1) district boards, (2) local boards and (3) union boards and panchayats under the new Village Administration Act which are rapidly superseding union committees.

* Except in the Santal Parganas where the Bengal Cess Act is in force and Sambalpur where the Central Provinces Local Self-Government Act is in force. There are also special arrangements for the local self-government of the district of Angul.

Under the first-mentioned Act, a district board is set up in 18 out of each of the 21 districts of the province. These district boards have a maximum membership of 40 persons. Three-fourths of the members are elected and hold office for three years. Not less than one-third of the remainder are required to be persons who are not salaried servants of Government. The chairmen of all the district boards except those in the Chota Nagpur division are elected. Their main duties are in regard to education and the Act prescribes that every district board shall be responsible for the maintenance and management of all primary and middle schools under public management within the district and also of medical relief, roads and bridges, sanitation, water supply and vaccination. A district board may also, *inter alia*, incur expenditure on irrigation works for the relief of famine or scarcity, offer rewards for the destruction of noxious animals within the district, hold fairs and exhibitions of cattle, country produce and agricultural implements, establish and maintain veterinary dispensaries and veterinary staff, make provision for the improved breeding of animals, make grants in aid of measures for improving agriculture and undertake any other local work likely to promote the health, comfort or convenience of the public. The road cess, which is fixed annually by each district board, provides about fifty per cent of the finance required and Government grants-in-aid about twenty-nine per cent. A board may raise loans for the purpose of carrying out any of the provisions laid down in the Local Self-Government Act. The provincial Government exercise a certain amount of supervision over the finance, budget estimates and the auditing of accounts of the district boards and its hands have been much strengthened in the last respect by the passing of the Local Fund Audit Act in 1925-26.

Apart from government grants, the income of the boards has remained almost stationary for several years and the increased expenditure on education and public health—the two subjects in which the boards take the keenest interest—has been met largely from government grants and partly by incurring less expenditure on communications.

The local boards are agents of the district board. There is one local board for each sub-division * of which there are two to four in each district. The members of the local board are the members of the district board elected in the particular sub-division together with such number of additional persons not exceeding one-third of the elected members as the local Government may allow. The district boards appoint these additional members. The local boards seldom contain any officials. They are entirely dependent on the district board for funds.

Union committees are elected bodies charged with certain administrative duties in a village or group of villages. These committees are agents of the district board and are in charge of less important roads, wells, primary schools, local conservancy and sanitation and generally of

* Except in three districts in Chota Nagpur and in Angul and the Santal Parganas, where there are no local boards, and in Hazaribagh and Manbhum, where there is only one.

dispensaries. They have power to raise local taxation ; but in most cases their funds are derived mainly from grants. These committees are now being superseded by the union boards constituted by the Village Administration Act of 1922. Union boards are elected bodies, the members of which hold office for three years. The minimum number of members is fixed at three and the maximum at twenty. Each union board, subject to the control of the district board and to such rules as the local Government may prescribe, is ordinarily responsible for primary education, medical aid, conservancy, sanitation, pounds, water supply and village roads. The union board may also, with the sanction of Government, be made responsible for the maintenance of the village police. It may also undertake "any other local work of public utility likely to promote the health, comfort, convenience or material prosperity of the public, including the development of agriculture and village industries....." (Section 41 (*i*) of Village Administration Act.) So far this provision has proved of little practical importance.

The union board may impose a tax upon the owners and occupiers of buildings within the union provided that the amount assessed on any person in any one year shall not exceed Rs. 30 and any person who in the opinion of the union board is too poor to pay the tax may be exempted altogether from assessment. The proceeds of this tax, of fines, fees or costs levied by panchayats and contributions from the district board are paid into a union fund. In fact, however, union boards are largely financed by district boards. For the first two years after a union board has come into existence, its district board must make a suitable grant in aid and must also contribute not less than the amount of any tax imposed by the union board. By the end of 1925-26, 153 union boards had been created. But, on the whole, they have so far been a disappointment. The members of the union board are averse to imposing taxation and the creation of union boards is not popular with district boards which take the view that it is impracticable without crippling their own finances to divert to these small local areas more money than was previously being spent on them. As was truly remarked in the Bihar and Orissa Administration Report for 1925-26 :

> "The progress of local self-government in every unit from the highest to the lowest will depend on the willingness of the people to tax themselves and to devote themselves to the service of the public without remuneration."

To complete this sketch of local self-government, it should be mentioned that a certain measure of judicial decentralisation has been attempted by the formation of panchayats with power to try petty criminal and civil cases. The area covered by a panchayat may be the whole of the area covered by a union board or it may be any number of 'circles' or sub-divisions of the union board area. The members of such panchayats are elected by union boards from among their own members and their period of office is also limited to three years. The local Government has power to direct the establishment of panchayats in any area where no union board exists.

13. PUBLIC HEALTH AND SANITATION.

Of the epidemic diseases, cholera is the most dreaded especially in the densely populated division of Bihar. The mortality rate from cholera is 2·4 in an average (ten-year) mortality rate from all causes of 34·2 per thousand. The climatic conditions are favourable to the spread of the disease for many months in the year and the average mortality from this cause is nearly 90,000 annually. A special corps of ten medical officers is kept at headquarters for dispatch to epidemic centres and one hundred vaccinators are kept in reserve during the danger period which lasts from the beginning of April to the end of September.

As elsewhere, fever is the greatest single factor in the mortality rate, but it is certain that the proportion of deaths attributed to this cause—23·3 per thousand as against a general mortality rate of 34·2 per thousand—is made too high. Few of the deaths ascribed to fever are due to malaria, but should rather be put down to pneumonia, enteric fever, phthisis, *kala-azar* and other fevers. Nevertheless, throughout the province malarial outbreaks on a serious scale do occur especially from March to the beginning of May and again from July to October. Quinine treatments are placed on sale chiefly through the agency of postmasters and, during the epidemic outbreak of 1925-26 in Orissa, 1,090 lb. of cinchona febrifuge were distributed free.

In Orissa, diarrhœa and dysentery are very prevalent and filariasis (elephantiasis) is common. The treatment of the latter disease by injections of antimony has been found to be beneficial.

Hookworm is widespread throughout the province. Leprosy is also prevalent, but the work of Sir Leonard Rogers and others has resulted in definite hope of cure in cases taken early and improvement in more advanced cases. Eight leper asylums are maintained and in spite of the prejudices of local authorities the treatment of lepers at hospitals and dispensaries is increasing—some 5,600 cases being treated in 1925-26 as compared with 3,700 in 1924-25. Plague is mildly endemic in certain parts of Bihar and the first quarter of each year shows a rise in mortality from it, with a more marked outbreak every four years or so, but on the whole there has been a steady decline in the mortality from this cause since 1905.

The average provincial death rate for the period 1915-16—1925-26 is 34·2 per thousand, but the figures for the last three years have been markedly below the average :—

1923-24	1924-25	1925-26
25·0	29·1	23·7

Up to March 1926, the Public Health Department consisted of four permanent officers only, the Director and three assistant directors in charge, respectively of the North Bihar Circle, the South Bihar Circle and the Chota Nagpur and Orissa Circle. From March 1926, the department has been much strengthened by the inclusion in it of the following :—

Ten medical officers of health for special duties in cholera and other epidemics,

Three medical officers of health for the three important municipalities of Puri, Gaya and Patna,

Five school medical officers of health (assistant surgeons),

Five assistant medical officers of health (sub-assistant surgeons),

One lady school medical officer,

One officer in charge of the Public Health Bureau,

One chemical analyst,

One superintendent, vaccine lymph depôt.

The officer in charge of the public health bureau is also personal assistant to the Director.

The duties which this central Public Health Department undertakes will be sufficiently indicated by the titles of the posts. The assistant directors are inspecting officers who spend much of their time touring.

There is also a central Public Health Engineering Branch which prepares schemes for water supply and drainage for both the provincial Government and local bodies. Particular attention has recently been devoted to the necessity of improving the supply of drinking water in rural areas. Capital grants of the following amounts have been allotted to district boards :

1923-24	1924-25	1925-26
Rs.	Rs.	Rs
86,700	45,000	3,95,000

The grants are made on the basis of a percentage of the estimated cost of constructing a certain number of new wells in each police station of every district. A sanitary school of instruction is maintained at Gulzarbagh where sanitary and health inspectors are given elementary training.

In addition to this central organisation, five district boards have adopted the scale of local public health organisation suggested by Government, *viz.* :—

1 medical officer of health,

4 sanitary or health inspectors,

12 sanitary gangs.

Government defrays half the cost of such organisation up to Rs. 10,000 in each district.

But it is not easy to get district boards to realise their responsibilities and the percentage of the boards' expenditure on sanitation to their total income shows no tendency to increase. In 1924-25, their expenditure was 5·70 lakhs or 4·38 per cent of their total expenditure.

The provision of medical relief in rural areas has proved to be a matter of great difficulty, but a good deal of progress has now been made by the district boards (on whom the duty of providing medical relief primarily falls) towards the aim set before them by Government, *viz.*, that there should be at least one out-door dispensary with a sub-assistant surgeon, or an officer of similar qualifications, in charge in each of the 539 thanas or police stations in the province. So far, 476 such dispensaries have been established at which treatment for the commoner illnesses and injuries is obtainable. But only 19 of these dispensaries are in

charge of Government sub-assistant surgeons. The rest are staffed by medical officers recruited by the district boards. For the year ending 31st December 1925, 3,442,894 patients were treated in these dispensaries. But, as yet, only a comparatively small proportion of the rural population has as yet reasonable access to medical relief, as the fact that one dispensary has at present to serve an area of 194 square miles and 77,133 people only too clearly shows. Special medical facilities for women (in particular the provision of trained midwives) in rural districts are still unfortunately almost entirely absent.

There is some tendency for local bodies to establish dispensaries in which the indigenous systems of medicine are practised; at present, it is the policy of Government to earmark its grants in aid of dispensaries for those at which the western system of medicine (allopathic) is practised. These grants in aid have been on a considerable scale and are being continued. Up to March 1925, 3¾ lakhs recurring and 12½ lakhs non-recurring had been distributed among the district boards and, in 1925-26, a further sum of 2½ lakhs recurring and 3½ lakhs non-recurring was distributed.

The higher forms of medical and surgical aid are provided by hospitals at district and sub-divisional head-quarters under the management either of the municipality or of the district board. These, unlike the dispensaries, contain wards for the reception of in-patients. They are chiefly staffed by government assistant surgeons whose pay is borne by Government.

In urban areas, there are important hospitals including a large hospital for women at Patna. There are also special hospitals for women at Gaya and Bettiah in charge of doctors belonging to the Women's Medical Service. But these institutions can contribute but little to the medical relief of the rural population.

A great advance has recently been made in the facilities for medical education available in the province by the establishment of the Prince of Wales Medical College at the Patna General Hospital. The college is affiliated to the University of Patna and students can obtain the degree of M.B., B.S. The first year class was opened in July, 1925. This new college has first class equipment, and should be a most important factor in providing trained medical men for the country side. In addition, the province maintains two medical schools for the training of sub-assistant surgeons. One of these is at Cuttack in Orissa and the second is now at Darbhanga in Bihar (where it was moved from Patna in 1925 in order to make room for the new medical college).

ROYAL COMMISSION ON AGRICULTURE.

MINUTES OF EVIDENCE

TAKEN BEFORE THE

ROYAL COMMISSION ON AGRICULTURE

Wednesday, January 12th, 1927.

PUSA.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Rai Bahadur Sir GANGA RAM, KT., C.I.E., M.V.O.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } (*Joint Secretaries*).

Mr. J. HENRY, Lohat Sugar Works, Lohat.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—I have no suggestions to make, but would emphasise the importance of the work being done by the Sugar Bureau, and the Coimbatore Cane Station. This district has grown large quantities of sugarcane from time immemorial, but the local Bhoorli cane has deteriorated badly even in the twenty-five years of my personal experience. In the last few years, the Coimbatore canes have been introduced and are rapidly taking the place of the Bhoorli. It has been found in the past that new canes have a tendency to develop disease and to be more subject to pests after a few years in these parts, and I think it most important that constant experiments should be made, and new varieties be tested constantly, to replace Co. 210 and 213, should need arise. Invaluable work has been done, but a new start may have to be made, if these canes go off.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—My experience is that nothing does much permanent good but slow and continued demonstration over more than one season, with the work done on the ryots' own lands and by their own people. I deal very largely with conservative and backward cultivators, who are apt to treat such things

as field demonstrations as shows, and who will listen politely to men sent by the Agricultural Department but rarely act on their advice after they have gone. I have found that the best way to introduce new seeds or new methods is to induce intelligent men of good standing, who are not of such high position as to be out of touch with the villagers, to test the new seeds or methods on a working scale in their own lands. Even then for the first year or two, I find that their efforts are looked on with suspicion, but if after two or three seasons the experiments show any great success and particularly if no extra expenditure is involved, the ordinary cultivator will take them up.

The history of the Co. canes in this district is a case in point. Over four years ago, I got a small supply of seed cane from Pusa and grew some four acres of excellent cane which I showed to hundreds of ryots. When the planting time came I tried hard to get the seed taken up and everywhere the men praised the cane, but each had a fantastic reason for not growing it himself. In the end I got it planted in various villages by men in my own employment, and by one gentleman of good position, and education. The cane did splendidly everywhere and, in the third year, a few of the more adventurous of the ordinary ryots tried it with success. We are now starting to harvest the fourth year crop, and within about a five-mile radius of here the cane is about seventy-five per cent Co. varieties, and there is a considerable area in small patches all over the district, while next year the ordinary Bhoorli cane will be less than half of the total planted all over North Darbhanga.

It should be noted that we had four seasons without any very unfavourable conditions and if, for any reason, the cane had been damaged by any agency the whole thing would have failed.

As it is, only a very small number of men plant the cane in rows, plant the right amount of seed, or indeed treat it in any way differently to their old Bhoorli cane.

QUESTION 4.—ADMINISTRATION.—(*c*) (i) The Agricultural Service has not touched the ordinary ryot of this neighbourhood, who uses all the methods of his ancestors. This conveys no reflection on the efficiency of the officers but it would take many more men than the department has to make any impression at all.

The Veterinary Service has made itself more felt, and the villagers are now beginning to understand and appreciate the efforts of the touring officers who treat cattle and inoculate them against disease. The prejudice against inoculation is, I think, gradually dying out. The main objectors now are certain old fashioned Brahmins.

(ii) and (iii) A good deal could still be done with regard to roads and light lines. The Bengal and North-Western Railway has an efficient service, but a good deal remains to be done in improving the means by which country produce is got to the railway stations. My company has laid a tramway twelve miles in length from Sakri station to bring in sugarcane, and this line is idle for eight months in the year. The Ryam Sugar Company has a somewhat similar line. Both companies had to overcome very considerable opposition when the matter was before the district board, and have had to agree to very prohibitive terms. Being private lines, it would be illegal to carry goods for the public.

There are, in my opinion, places where lines such as ours would be invaluable to the ryots to bring their produce to the railway and could be run without loss by public bodies.

QUESTION 5.—FINANCE.—(*a*) The co-operative credit societies are the best way of financing the ryots. They should not only find the money but should in time teach the ryots thrift and proper business methods.

(*b*) I think Government *taccavi* is useful in emergencies, such as drought or flood, but I do not think it suitable for ordinary agricultural temporary loans.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) The main causes of debt are crop failure, litigation, extravagance over ceremonies, and sometimes a man gets into debt through buying more land.

The only source of credit is the cultivator's land, on which he can raise money from the local moneylender, or from his co-operative credit society.

The reasons preventing payment are the same as the reasons for getting into debt, with usury to add to his trouble. I think it is probable that about seventy-five per cent of the cultivators in this part are in debt and most of them will never be out of debt. The village moneylender rarely seizes a man's land for debt, or indeed harasses him actively in any way, unless a quarrel arises; but the debt goes on, the ryot pays regularly all he can afford, and the debt gets no less, while the moneylender keeps complicated accounts of fresh advances, interest, compound interest, and refunds.

(*c*) To limit the right of mortgage or sale will merely spoil the cultivator's credit, by taking away the only security he can offer a creditor.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) I see no means of stopping this.

(*b*) The customs regarding succession are bound up with the whole social system in the villages. Every son gets his share of the land.

(*c*) I do not think much would be gained by legislation.

QUESTION 8.—IRRIGATION.—There is practically no irrigation in North Darbhanga, except for growing rice in the rains.

The difficulties are that in time of drought, when water is most wanted, the wells and tanks have to be kept for drinking water for cattle, as well as for human beings, and are apt to dry up, while our local streams are dangerous from flood in the rains and go down almost to nothing for the rest of the year.

I believe a good deal could be done by means of wells out in the fields. A well costing a cultivator about five hundred rupees would probably save the crops of about three acres. It is largely a question of finance. Landlords could help by making it easy to dig wells and tanks.

Embankments are very dangerous, however useful in droughts.

QUESTION 9.—SOILS.—(*a*) (iii) We are subject to disastrous floods, and the question is complicated by vested rights in old standing *bunds*. This is a declared district under the Embankments Act with the result that new *bunds* cannot be made without permission or old *bunds* enlarged. We are, however, at the mercy of conditions in Nepal, and after heavy rain in the adjacent hills the floods come to our light alluvial soil like water thrown along sand from a bucket; it may follow the course made by former buckets or it may not. The only safe principle is to have as few obstructions as possible.

Erosion by local rain water is well understood by the ryot, who works small self-contained plots as a rule.

(*b*) (i) I took over some twenty acres of land round our factory some seven years ago. It was then in one unbroken stretch, full of

roots of coarse grass and so poor that no useful return could be got. I put good drains round and across it, used green manure and the mud filtered from the sugarcane juice, and worked the land on the following rotation—

Sugarcane in the ground—a year and a quarter.
Fallow—half a year.
Oats—half a year.
Fallow—half a year.

Then start preparation for cane again. The land is now distinctly good, and should be first class in a few more years.

(*c*) The land round here is cultivated to the last acre.

QUESTION 10.—FERTILISERS.—(*a*) Enormous use could be made of fertilisers, but it is a question of finance. The ryot has to get the quickest return with the least expenditure. The only manure used on any large scale is the ashes from the household fires and the small proportion of cattledung which is not used as fuel.

(*c*) I am anxious to get our cane-growing ryots to accept fertilisers such as ammonium sulphate or nitrate of soda at the time of planting, repaying the cost price, interest free, when they sell us the cane. I hope to get a few men to do this this year, but am afraid that very few are enterprising enough to agree.

(*d*) I know of none anywhere near here.

(*e*) I have made an expensive experiment this year with nitrate of soda over some ten acres of sugarcane, by alternate belts manured and unmanured, and have had the same thing done in the fields of several ryots. The crop will be checked carefully and the full results known in March, when I will send them in if required.*

(*f*) I see no way of stopping this disastrous practice. Wood fuel is out of the question, as the district is already being rapidly denuded of trees, and coal and compounds of coal have to be transported too far to be economical.

Great loss is also caused by sending away all the cattle bones. Thousands of *maunds* of cattle bones are sent from Sakri station alone.

QUESTION 12.—CULTIVATION.—(i) My impression is that the ryot, after long years, has arrived at a sort of point of stability, *i.e.*, he has small ploughs, bad bullocks, often inferior seed, uses little manure, and usually goes in for a rotation which will give one crop after another as quickly as possible. In this way he gets a poor return, but the return remains constant and the land does not deteriorate.

(ii) His rotation is usually designed to give him a return as early as possible, as he is always short of ready money. He would undoubtedly get a larger return over a number of crops if he would occasionally rest the land by keeping it fallow, but the pressing need for money as quickly as possible overcomes other considerations.

QUESTION 13.—CROP PROTECTION, INTERNAL AND EXTERNAL.—Practically no measures are taken for the protection of crops against pests. If borer attacks the cane, or caterpillars the *rabi*, it is just endured. Both these pests have done great damage in the past year. Borer-damaged cane is used for seed for the coming year by many ryots.

Mr. J. Henry.

**Note subsequently supplied by witness*:—Yield from land treated with nitrate of soda 900 maunds of sugarcane per acre: from untreated land, 560 maunds per acre. I can give no figure for the lands treated by ryots as they mixed the outturn of the plots, but I saw the crops before harvest and can say that the good result was apparent to the eye.

QUESTION 14—IMPLEMENTS.—The implements used in North Darbhanga are practically all the same as have been used for centuries. Improved implements are almost unknown among the ordinary cultivators.

Co-operative credit societies can help to popularise new implements and are the best channel, but the bullock in these parts is so small and weak that it will be necessary to improve the breed before they can be expected to pull most of the improved ploughs I have seen. I know no district where the cattle are so poor.

QUESTION 20.—MARKETING.—Communications have a lot to do with this. Ryots living a long way from the railway have to be content with much worse prices for their produce, and depend largely on the visits of travelling agents, who buy as cheaply as they can and have little competition. Thus, I am informed that the present prices of the new paddy, vary as follows:—In Bhaduar village, about ten miles from a railway station, the ryot is selling at about thirteen and a half *seers* to the rupee. In Belahi about six miles from the railway station, the rate is thirteen *seers*. In Madhabani town, on the railway line, it is about twelve *seers*.

The cultivator ten miles out gets some five and a half annas less per *maund*, and there are many places more than double that distance out.

This is a densely populated district. Light tramways would be a great help and should pay well as feeders to the Bengal and North-Western Railway. They should run north and south as far as possible, to avoid crossing the floodway. I believe, for instance, that a light line from Khutauna to Jhanjharpore would be a success in every way.

As mentioned in my reply to Question 4, we have a light line for our cane. This line enables us to take about 1,50,000 *maunds* of sugarcane which it would otherwise be very difficult to transport, but we had great difficulty in getting the terms arranged with the district board. Eventually we had to agree to pay one anna per ton royalty, and also undertake all the repairs not only to our line, but to the cart and carriage road alongside which it runs. We pointed out in vain that we were saving the road from heavy cart traffic for which the board would have to mend the roads, and that we were carrying the road cess payers' produce to its market. This line could carry all sorts of produce, and be a boon to the ryots, but we are not a public carrying company and our line lies idle for eight months.

It is obvious that anything that increases the cost of transport must reduce the price we can pay the ryot for his cane.

QUESTION 22.—CO-OPERATION.—A great deal has been done and the Central Bank which I know best has a good record, but there are many difficulties. But for the work done by a few public spirited gentlemen in Madhabani in checking and controlling accounts, and but for the audit and supervision of the Government staff, the majority of the societies would bankrupt themselves in a short time. The average society is very far from the point where it would be safe to let it control its own finance. I am not in favour of the multiplication of societies for different objects, and would prefer to encourage the existing agricultural credit societies to expand and make themselves useful in the various directions indicated in the Questionnaire. Our present difficulties are due to the lack of responsibility shown by the headmen and *panchas* in societies and the tendency to conceal outside liabilities. I fear it is not unknown for the head *panch* of a society which never defaults in its instalments, to pay the shares of many members from his own pocket, and take bonds from them

privately at much higher interest rates. I am a strong believer in the co-operative credit societies and believe that for all such purposes as the introduction of new seeds, education in better methods, and in a number of other ways, they are the best channels by which to reach the ordinary villagers, but I do not think that it is in the interests of the societies themselves to pretend that any large proportion of them could be trusted to do without the closest supervision in every direction. There must be close association between such Government departments as the Agricultural, Veterinary and Co-operative, if the latter is to develop anything like its full usefulness.

Oral Evidence.

64,921. *The Chairman*: Mr. Henry, you are in the Lohat Sugar Works?—Yes.

64,922. What exactly is your own position?—I am Cane Manager; I am responsible for the cane supply of the two factories we run.

64,923. Will you tell us the sources from which cane is obtained?—About nine-tenths of our cane is purchased direct from small growers for cash, with a very small amount for which we pay in advance. We purchase it at wayside railway stations and depots; that is nine-tenths of our supply.

64,924. Is the small cultivator paid by weight?—Yes, he is paid by weight.

64,925. He is not paid on quality?—No.

64,926. That means that he has no encouragement to grow cane of the highest possible value?—We would very much like to do that, but dealing with the small ryot as we do, it is practically impossible, as it would mean holding up all payments until the sucrose value was determined; we have to pay cash, and we find that the ryot must know what he is getting.

64,927. How long does it take to determine the sucrose value?—If you mean that we should pay different rates to different people, the cane is all mixed. In the majority of cases, perhaps one man will bring one cart-load in a day.

64,928. Is there any real reason why he should not be paid on the sucrose value of that particular load?—That is impossible, because we buy perhaps a hundred cart-loads at one railway station, which is loaded say into ten railway wagons and sent into our mills; it would be impossible to keep them separate.

64,929. The cultivators from whom you are buying cultivate in too small plots?—One man may give me ten cart-loads in a year; the average man's supply would probably be fifteen *maunds* out of a total of seventeen thousand *maunds* a day. If the ryot would consent to any scheme by which he could be paid afterwards, when the sucrose was decided, we could do so; but he would certainly put the cane through a bullock mill the moment he heard of it. He would require a great deal of education before he would do that.

64,930. On page 2, you tell us about your experience in the matter of demonstration and propaganda, and you point out that the cultivator is not very ready to adopt improved varieties?—He is very slow; it is the most difficult task to get him to do anything at all.

64,931. What is the percentage of increase in yield as between the local variety of cane and the improved varieties?—Certainly sixty to seventy per cent.

64,932. The Commission has been told by many witnesses that, provided an improved type of cane promises a sufficiently high percentage of advantage, the cultivator, as a rule, is ready enough to adopt it. Can you account for his conservatism in this particular case?—He has now discovered the value of improved varieties, and the area under them is doubling itself every year. I stated it in my note. The history of the thing was this: I had only very small supplies; in the first year they absolutely refused to look at it; in the second year I got a few of my own employees and one or two better class men to grow the cane; in the third year a few more ryots took to it and in the fourth year about fifteen hundred acres were under cultivation.

64,933. I was concerned to discover whether there had been any previous disappointment to account for the disinclination of the ryots?—No; I do not think so.

64,934. In answer to Question 4, under the heading Administration, you say: "The Agricultural Service has not touched the ordinary ryot of this neighbourhood". Do you regard that as a criticism of the Agricultural Service?—I regard it as a criticism of the strength of the Agricultural Service, not of the efficiency of the personnel.

64,935. *Professor Gangulee*: Have you any suggestion as to how the department can be improved?—Only by increasing the number of men. I do not suppose one per cent of the ryots whom I have opportunities to deal with have ever met an Agricultural Department man. The population is between 900 and 1,000 to the square mile and I cover several hundred square miles.

64,936. *The Chairman*: On page 2 again, you are dealing with your own experience in the matter of laying down a light railway and you say: "Being private lines, it would be illegal to carry goods for the public". Did you attempt to obtain a license or whatever the necessary authority may be?—We tried to float a public company under the Act for light lines. The matter went up to the Railway Board at Simla and we found that the capital involved to comply with their requirements would be enormous.

64,937. Assuming for a moment that you were allowed by law to carry on the business, would these rails that you have laid down and the rolling stock that you have purchased be capable of carrying all the year round?—They would carry goods all the year round except when there were floods. But, speaking of normal times, we can carry goods but not passengers.

64,938. Finally the district board drove a hard bargain and insisted upon a royalty?—We have to pay the whole expense of keeping the road in order and pay a royalty as well.

64,939. That is because you use the district board's ordinary road?—We are allowed to keep a line eight feet wide on the flank of the district board road.

64,940. *Sir Henry Lawrence*: You are allowed to lay your private line?—Yes, on condition of paying a royalty of an anna a ton on everything we carry and keeping the whole of their road protected against any damage; that is, doing cart and carriage road repairs.

64,941. *The Chairman*: Is it the position that by law no individual or private corporation is allowed to carry goods for the public?—The local authority would like us to carry on. It is only the law that stands in the way. In fact, the district board's chief objection to us is that we only carry goods for our own mills and not for the public.

64,942. Dealing with the question of irrigation, you say: "A well costing a cultivator about Rs. 500 would probably save the crops of about three acres". That is as far as a bad season goes?—Yes.

64,943. What do you think that that well, costing Rs. 500, would be worth in a season of normal monsoon?—I think there is always a time when irrigation is necessary in every district.

64,944. Have you any actual experience of the advantage which well irrigation gives?—I have no personal experience. I know one man, an Indian, living about five miles from me who has done this and he informs me that the results have been very good indeed.

64,945. Has he introduced a new crop?—No; he works on all kinds of country crops.

64,946. Has he ever told you what the increase in his outturn has been?—I doubt if he keeps actual figures; they never do it.

64,947. How about lift irrigation from the rivers?—There are very few permanent streams and I think they would only touch a very small portion unless you had channels to carry and distribute the water to the fields.

64,948. Have you ever tried to persuade the cultivator to accept fertilisers in part payment for their cane?—I started last year and I am trying to do it. The most I hope to get taken in that way is about ten tons.

64,949. And, in addition, you have the idea of persuading the cultivators to take fertilisers at the planting time and repay the cost price, interest free, when they sell the cane?—That is what I was referring to just now. My idea is to get them at the time of planting to accept ammonium sulphate or nitrate of soda and to realise the price when they sell us the cane.

64,950. You dock the value off the price of the cane?—Yes, when they give us the cane.

64,951. On page 4 you give your view as to the causes which have reduced the fertility of the soil to perhaps the minimum possible point. If I understand you aright, you regard the debt of the ryot as the principal cause for that tendency?—I think so. I think it is more a question of money; he must get his money quickly.

64,952. Largely because he is in debt?—Yes; the ordinary small man is almost always in debt.

64,953. I gather from your note that you attach importance to improved communications in relation to marketing?—Yes.

64,954. Are you familiar with the affairs of the local district board?—Yes; I have been on the board for the last twenty years.

64,955. Is it within the financial capacity of the board to keep the roads in proper order?—I think, considering that they are only clay roads and unmetalled, they are fairly well kept. I think more feeder roads might be made and they are improving in that respect.

64,956. Is any new metalling going on in your district?—Very little. The metalling helps the fast traffic. There is never any metalling for agricultural produce anywhere.

64,957. How do you fix the price the cultivator gets for his sugarcane?—We fix the price, or rather my company fixes the price, simply by the price of sugar. The basic price we give is in proportion to the price of sugar. If sugar is at its ordinary price, half its price in annas is approximately the price of sugarcane. That is, if sugar is twelve rupees a *maund* the price of cane will be approximately six annas.

64,958. Are you in competition with other mills for the cane that you buy?—No.

64,959. So that the cultivator has no market other than your own self?—We compete with the bullock mills. If our price is not a fair one he can make his *gur* and sell in the local market.

64,960. By that means he can test the price?—Yes; and a certain proportion of the sugarcane goes to the bullock mills.

64,961. Have you ever heard the suggestion to limit the number of factories in the district?—Of central factories, yes; I heard the proposal.

64,962. You think a scheme of that sort would be to the advantage of the ryot?—I think it is necessary. For instance, suppose a factory starts up close to ours we may have under-cutting prices or rather paying high prices. I think one factory or both will have to close down in a very short time and that will certainly not be to the advantage of the ryot.

64,963. On pages 5 and 6 you deal with the question of co-operation. Have you had close personal experience of these credit societies?—Yes, I have been an honorary organiser for a number of years, and I am at present vice-chairman of a Central Bank.

64,964. What exactly is an honorary organiser?—An honorary organiser is a private individual who gives his aid in organising societies in his neighbourhood. I believe he is gazetted in Government lists as such; I am not sure.

64,965. You organise primary societies?—Yes, in my neighbourhood.

64,966. How many primary societies have you assisted in organising?—Personally, perhaps fifteen or twenty.

64,967. Have you watched their after-careers?—Yes.

64,968. Have they been well-managed on the whole?—The first ones I started were well-managed; I was then in charge of a zamindari; I looked after them personally while I was in the place of their landlord as well as their honorary organiser. As long as I was in the place of their landlord they worked well. Since I came away and took my present position two of them have been liquidated.

64,969. Of the fifteen or twenty societies that you helped to organise, how many are now fit to manage their own affairs through their own elected committee?—I do not think I know any primary society which I consider fit to manage its own affairs without close supervision.

64,970. Have there been any cases of malfeasance on the part of officers of these societies?—Yes. All the societies in our neighbourhood are grouped under a Central Bank.

64,971. I see it is your view that, for a long time to come, supervision and reliable audit will have to be provided from above?—That will be absolutely necessary in my opinion.

64,972. *The Raja of Parlakimedi*: Have you experimented to see after what period the sugarcane begins to lose its sucrose content?—Our experience is that you can begin to work about the beginning of December; the curve of purity and sucrose rises probably till about March; I should think the end of April is about the last economic time for working.

64,973. And after it is cut, for how long can it be said to remain without deterioration?—I think after 48 hours it begins to deteriorate.

64,974. Have you had actual experiments conducted as to that?—I cannot give you the figures off-hand but we are constantly watching that.

64,975. Have you a sufficient cane supply at present for your requirements?—No; for the last four or five years we could have taken all that could be offered, and more.

64,976. What is the extent to which your jurisdiction extends?—My company has two mills, one at Lohat and one at Supaul in Bhagalpur district. We take about seventeen thousand *maunds* of cane in a day.

64,977. What is your annual output of sugar?—Approximately one lakh of sugar in a good season.

64,978. What sort of sugar do you make?—Light brown sugar, fairly white, not first class white sugar.

64,979. You have no difficulty in selling it, I suppose?—It is sold by brokers; I believe most of it goes to the Punjab.

64,980. Is any consumed in Bengal?—It is sold all over India, but I think the bulk of it goes to the Punjab. I have nothing to do with the sales; the sales are handled by brokers.

64,981. Do you make any concession to ryots requiring large quantities of setts from you?—The only help I have ever given is in getting out these Pusa canes, and there we give them every possible help.

64,982. What is the nature of the help?—We give it on the same terms on which I suggested the giving out of manure; that is to say, we give out these canes and realise the cost price of the cane, without interest, the following year when the cane is grown. That has been done in order to introduce these superior canes.

64,983. Have you tried to grow beet sugar?—I tried beet sugar once about five years ago but I found it would not keep; it started drying up. It was planted about October or November; it ripens in our district in about February and March, just at the time when the west winds are on, and it is just at the time of the sugarcane, so that it was useless for us. If it had kept good after the sugarcane was finished it would have been a working proposition, probably.

64,984. Given the irrigation facilities, would it not have worked satisfactorily?—I do not think it will keep after it ripens in this district. I only made one experiment; it ripens just as the hot weather starts.

64,985. You manufacture sugar from jaggery also, do you not?—No, of late years we have only made sugar direct from the cane.

64,986. Does it pay better to manufacture direct from the cane?—Yes, it is uneconomic for the cultivators to put it through inefficient bullock mills and sell the result to us rather than sell the cane to us and allow us to use efficient machinery.

64,987. Would you take any sugarcane from other parts of the Province?—No, it would not be possible; it cannot be crushed after a journey of more than 24 hours; on account of the dryage of the cane and loss of purity a journey of more than 24 hours is not economical.

64,988. *Sir James MacKenna*: What area is there under Pusa canes in the tract in which you buy?—About fifteen hundred acres this year, as far as I can judge.

64,989. Do you buy these canes separately or give a premium for them?—No.

64,990. Any advantage that the cultivator gets from the cane, I take it, is in the increased outturn?—Yes; when these canes come to be really half or more than half of our outturn, and if, as we hope, that gives us an increased outturn of sugar, we could of course then afford to pay a better price for the cane.

64,991. You would have some idea then of the sucrose content?—Yes; we know the sucrose content now. It is not a sufficient quantity to affect the gross outturn of our mills.

64,992. *Professor Gangulee*: Do you grow mostly Coimbatore canes on your estate?—I grow practically no canes; I buy from the ryots. These canes, the introduction of which I have just been telling about, are Pusa canes.

64,993. You distribute seedlings to the ryots?—We have distributed seedlings of the Coimbatore canes.

64,994. Do you distribute fertilisers?—I am trying to introduce that now; so far I have not succeeded.

64,995. Of the two fertilisers, sulphate of ammonia and nitrate of soda, which would you prefer for sugarcane?—I am not prepared to offer an opinion.

64,996. You say you desire to distribute fertilisers; what fertilisers have you in mind?—The fertiliser with which I experimented last year was nitrate of soda and I got extremely good results; I am thinking of introducing a few tons; I do not hope to get more than ten tons taken up, but I am thinking of giving that out as the ryots have seen it tested.

64,997. Oilcakes?—With oilcake much more bulk is required; it is very good, but I think it is probably more expensive at the rates which I should have to pay.

64,998. At what time do you distribute the seeds and fertilisers to the ryots?—I give the seeds out at the time of planting; I charge them the rate at which I buy and I allow them to pay the price when they give their next crop of cane.

64,999. You do not charge interest?—I charge no interest.

65,000. Is it your experience that *gur* consumption is increasing, decreasing or at a standstill?—I do not notice much difference in the last few years, but I have no statistics to give.

65,001. Is the co-operative movement making any headway in your district?—Yes, I think it is; the number of societies is increasing, and I think they are improving in their methods, but they require the very closest supervision.

65,002. You said the number of co-operative societies is increasing?—Primary societies.

65,003. Have you any experience with regard to the quality of these primary societies?—Well, they are audited and classified every year by the auditors who come round, and they fluctuate. Our experience is that an "A" class society is practically never heard of in our parts; there are a few of "B" class; the bulk are probably "B" and "C".

65,004. I take it you come into contact freely with the ryots round about you?—Yes, I meet them constantly.

65,005. You meet ryots who are members of a primary co-operative society and others who are not; have you noticed any change in the outlook?—No, I am afraid I cannot say I have noticed any change.

65,006. You do not lend any money to your ryots?—My company give advances about three months before the season starts, without interest, and realise it on the price of the cane. When cane to be delivered in December and January is half grown, say in July and August, we give out advances.

65,007. So that you give advances, seeds and fertilisers, as the case may be?—Yes, we are willing to give fertilisers; I cannot claim to have done it.

65,008. On condition that they must sell their produce to you?—Naturally; anybody who took an advance from me would do so.

65,009. *The Raja of Parlakimedi*: Do you demand any other security from the ryot?—No.

65,010. I suppose you take his position into consideration?—Yes. We make no bad debts; it is a matter of confidence.

65,011. *Professor Gangulee*: In the manufacture of sugar do you use the sulphitation or the carbonatation process?—The sulphitation process.

65,012. *Mr. Calvert*: On the question of indebtedness, is it your experience that these village moneylenders keep accurate accounts?—I think they do keep actual accounts, but nobody knows them or understands them but themselves; nobody ever looks at them or examines them; I have had them put up to me to show the debt; they are extraordinarily involved, with compound interest carried on in the most complicated way.

65,013. I gather that so long as the moneylender receives a regular income from his client he does not press for the return of the principal sum advanced?—I think that is the ordinary practice, as long as there is no outside grudge of any kind.

65,014. You are rather opposed to the idea of limiting the right of the ryot to mortgage or sell his property?—Yes, I think it would only take away the ryot's credit.

65,015. Taking the use he has made of his credit in the past, has he used that credit for productive purposes to any very large extent?—I think most of it goes on litigation and ceremonies. I had an instance the other day: one of the company's servants came to me and wanted me to advance Rs. 100. He was one of four brothers who together own eleven *bighas* of land as tenants. Their father had died and their friends and relatives were forcing them to spend Rs. 400 on the funeral ceremonies, considerably more than one-tenth of their capital.

65,016. Do you favour giving credit for that purpose?—No, most certainly not, but it is very difficult to stop it.

65,017. Do you think the cultivators require much actual cash purely for their cultivation?—I think that would entirely depend on the season.

65,018. A large part of the cost of cultivation is their own labour?—Yes.

65,019. The actual cash requirement is not very great?—It depends what you mean by "very great". If a man has an acre of land he ought to finance the cultivation of that in a favourable season with about Rs. 15.

65,020. You regard the co-operative society as the best means for the introduction of new seeds and education in better methods?—Yes. I advise preference being given to organised bodies of cultivators over

individuals. I think that one great advantage is that the best of these men in the societies come in to our Central Banks as village directors. There they meet the more educated men who are the directors of the banks. They hear things talked out where the representatives of the societies can come in and they are in a better atmosphere than men who do not come in contact with these things.

65,021. Do you find that the members of the co-operative societies are more willing to listen to advice?—I think they are very much inclined to leave it in the hands of their *panchas* or committees.

65,022. You think that close supervision is still required? Do you think that much good would result from steady and persistent education in co-operative organisation?—Yes, I think there is a slight tendency to improve it, but if any society is left to itself without audit for, say, two or three years without inspecting clerks going round, then I think that malpractices would creep in.

65,023. Do you think that steady and persistent education will still be required for a long time to come?—I think we are probably very backward compared to other districts, but there is a tremendous lack of education still.

65,024. *Mr. Kamat*: Is your company a joint stock company?—Yes, it is a private limited company. The shares are not on the market.

65,025. Has it been paying a steady dividend?—I do not see the accounts, as a matter of fact. It is a private company.

65,026. You manufacture the brownish sugar?—Yes, light brown sugar.

65,027. What are your prices as compared with those of the imported Mauritius sugar?—For white sugar I think we probably get about a rupee a *maund* less than the ordinary sugar. We sell probably in the neighbourhood of twelve or thirteen rupees at the present rates.

65,028. Do you think that, however cheap the imported sugar might be, your works would be able to stand the competition?—No, I think that if sugar fell much lower than it did last year it would be almost impossible for any sugar factory to work in India. If sugar dropped to under ten rupees a *maund* the position would be most precarious.

65,029. Is it not the case that the fate of your factory is more or less dependent on the imported Mauritius sugar?—It is dependent on the price of sugar. The rate is dependent on the price of imported sugar.

65,030. What I want to know is whether you can stand on your own legs in spite of the competition between your sugar and imported sugar. Have you that confidence?—That would depend entirely on prices. As I said just now, if the price of sugar fell to less than ten rupees a *maund* the position would be precarious.

65,031. *Sir Henry Lawrence*: Can you tell us anything more about this suggestion of licensing sugar factories? In what way would it be to the advantage of the ryot?—Simply inasmuch as the companies could then work. I cannot think it would be to the advantage of the ryot if the companies were to go smash, which I think would be the result of any cut-throat policy.

65,032. Do you know of any area in which there is this cut-throat competition between factories?—I have no experience.

65,033. You are not faced with it yourself?—No. We have never had any unpleasantness of this kind.

65,034. Have you seen any detailed discussion as to how this licensing system would work? Would special legislation be required for bidding?—I do not see how it can be done without legislation. It has never affected this company, at any rate.

65,035. As matters stand you are in a position to advance fertilisers and good setts of cane to the cultivators around you, in the confidence that they will sell their cane to you?—In practice, yes. It is all a question of confidence in our fair dealings, and personally I think the ryot is very honest.

65,036. Your company is a private company. Can you tell us who own the shares?—The shares are practically half and half owned by Messrs. Pierpont Morgan and the Maharaja of Darbhanga.

65,037. *Sir Ganga Ram*: I would like to know whether you push the rate forward?—The rate is fixed in the beginning of the cane season.

65,038. Is it not sold to you at a certain rate?—We give certain advances in order to make them legal. We put in a rate of four annas but we have never yet bought at four annas from any one.

65,039. *Dr. Hyder*: You have referred to the cultivator. Does this piece of poetry, which I shall read out, accurately represent the facts as stated by an experienced Indian official:

"Then comes a Settlement *hakim* to teach us to plough and to weed,

(I sowed the cotton he gave me, but first I boiled the seed),

He likes us humble farmers, and speaks so gracious and wise,

As he asks of our manners and customs; I tell him a parcel of lies"?

—There is a substratum of truth in that I think.

65,040. *Professor Gangulee*: Even in poetry?—Yes.

65,041. *Dr. Hyder*: With regard to the manufacture of sugar, what is your opinion about the agency system? Is it a good system?—I am employed by managing agents.

65,042. Is it an expensive system?—I know nothing that is against the system.

(*The witness withdrew.*)

Thursday, January 13th, 1927.

PUSA:

PRESENT :

The MARQUESS OF LINLITHGOW, D. L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. Kamat.

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } (*Joint Secretaries*).

Mr. C. G. ATKINS, The Dowlatpore Agricultural Concern, Rusera Ghat, Bengal and North Western Railway.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—Although I have no experience of agricultural education, I take the liberty of making the following comments :—

(i) There is a complete absence of teachers and institutions in my locality, which is within the sub-divisions of Begusarai and Samastipore, comprising a very thickly populated area of some five thousand square miles.

(ii) Yes, there is an urgent need of teaching facilities in the two districts mentioned above.

(iii) Yes, teachers should be drawn from the agricultural classes, for they would, I believe, take a greater interest in and master the subject more readily than others.

(iv) I am not aware of what the attendances are in existing institutions. One measure I would suggest as likely to stimulate the demand for instruction is that the people should be made to realise the benefits of such tuition. This can be achieved by the aid of Government in starting demonstration agricultural farms in rural areas under the management of those who have already received agricultural education. For example, if Central Co-operative Banks had demonstration farms worked by qualified men (who could also be teachers), it would have the effect of interesting rural agriculturists in advanced methods of cultivation. Such farms would be of greater value than Government demonstration farms.

(v) The main incentive, as far as I know, for lads to study agriculture is the hope they entertain of securing Government posts.

(vi) I do not know from what classes pupils are drawn at present but it is very probable that they are not from the agricultural classes.

(viii) (*b*) and (*c*) I take it that this means small demonstration plots near village schools, for agricultural education. This, I think, would serve a useful purpose, provided they were under proper control and supervision. For instance, if a Central Bank had a demonstration farm with a qualified teacher, that teacher could visit the school farms and school plots and supervise the tuition of pupils.

(x) I consider that agriculture could be made attractive to middle class youths on the following lines:—

(*a*) Facilitate their agricultural training as mentioned in paragraphs (iv) and (viii).

(*b*) Offer qualified and approved youths grants of Government lands in the Province where possible, or help them to obtain settlements of lands from landlords who own large tracts of uncultivated lands; in other words, popularise outside settlements.

(*c*) Government should aid them pecuniarily in such settlements on advantageous terms. For example, there are large tracts of fertile lands to the north of the Bhagalpore district which is overgrown by scrub jungle. These lands are partly owned by local landlords and are partly Government Court of Wards estates. It is a custom of the landlords to settle such lands on receiving payment of a small premium in cash, at a very low annual rental. These tracts of land would be brought under cultivation provided men and money were forthcoming. Besides Bhagalpore I would mention the districts of Purnea and Orissa. I have little doubt that there are other fertile and uncultivated parts of the Province (or India for that matter) which could be colonised by middle class youths if the idea were made widely known and attractive.

(xii) Adult education in rural tracts can be popularised by the formation of demonstration farms as suggested in paragraph (iv).

(xiii) The most, and perhaps the only, effective administration of agricultural education would be under the immediate control of Central Co-operative Banks, with qualified teachers as mentioned above. The finance could be almost entirely borne by co-operative societies and Central Banks where they exist and are of some years' standing, if the Government of India Co-operative Societies Act II of 1912 were amended. [I elucidate this point in answer to Question 22-Co-operation (*b*) (iv).] If there were any shortage of funds, money could be lent by Government to Central Banks at a low rate of interest. I have no suggestion to make, in answer to this question, for areas where the co-operative movement is not active.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) and (*d*) I manage an estate of approximately 1,600 acres and the chief crop

grown is sugarcane. A few years ago the various Co. canes were introduced by Pusa. The first year's results proved that these canes were capable of a hundred per cent increase in yield over the indigenous varieties. For reasons philanthropic and pecuniary I decided to try to induce the cultivators to grow the Co. canes, and I succeeded beyond expectations. The methods I adopted were as follows:—

(i) Holding meetings in various parts of the country, announcement of such meetings being made by beat of drum. These meetings were attended by large crowds and, at such meetings, speeches were delivered by educated men, who were large landlords, who eulogised at great length the merits of the new canes.

(ii) By distributing in great numbers, to the public, a pamphlet extolling the advantages of the above-mentioned canes.

(iii) By field demonstration on my own farm. I cannot lay too much stress on the effectiveness of lectures at public rural meetings and the distribution of pamphlets, in the way of propaganda work.

(*b*) A most effective field demonstration would be this:—A teacher goes into a village and selects, say, an acre of land belonging to some tenant. The owner decides what crop he intends growing in the field. The teacher undertakes at his own expense (or the Central Banks' or Government's or whoever it may be) to grow the same crop in half the land according to his methods, the owner following his own *modus operandi*. A careful account is kept of all charges. When the crop is harvested and a profit and loss account made out, it will at once be apparent that improved cultivation is worth while.

(*c*) The only method that I know which will induce cultivators to adopt expert advice is that that advice should be available without difficulty, and free of any charge: that people who are qualified to give such advice should visit villages and tender their counsel to the cultivator while at work whether he (the cultivator) wishes it or not.

QUESTION 4.—ADMINISTRATION.—(*c*) (i) No, I am not entirely satisfied with the services rendered by the Agricultural Department, as indicated in my reply to Question 2. The Veterinary Service, especially, leaves much to be desired. For instance, there is only one Veterinary Assistant Surgeon at Samastipore and one at Begusarai, which is quite inadequate to meet the demands of the enormous population of the two sub-divisions.

(ii) The bribery and corruption that is prevalent at most railway stations is an appalling scandal. It is a common practice that before a stationmaster allots a merchant a wagon, the stationmaster has to be illicitly gratified, which means that this expenditure comes out of the cultivator's purse. The distribution of wagons to stations by the railway authorities appears to be haphazard; for example, it is a common occurrence at my station, Ruseraghat, which is a large station, for there to be a shortage of wagons while, at the same time, there is a surplus of wagons at other stations on the line. The merchants are therefore constrained to cart their merchandise, which mostly consists of agricultural produce, to those stations which have a surplus of wagons, though they are often many miles distant. This state of affairs often exists for long periods at a time, and therefore must reflect on the well-being of the agriculturists.

(iii) *Roads.*—The state of village roads is disgraceful for they are entirely neglected and at certain times (which often extends into

months of the year) a village, or a number of villages, is completely isolated so far as cart traffic is concerned. With regard to the main roads which are under the jurisdiction of the district boards, a curious and unsatisfactory condition of affairs exists which does not prevail in any other parts of India, (or the world I dare say); it is this: The tenants and landlords pay for the upkeep of these roads but they are not, in the vast majority of cases, allowed to use the better portion of the roads, (such are the district board's bye-laws) which results in great hardship to man and beast. The better portion of the road is exclusively reserved for what is termed "fast traffic" such as motor cars, carriages, etc., so that the cultivator if he can, and when he does, reach the main road with his cart, has to content himself with travelling in a separate track which is usually dreadful. The consequence of a carter trespassing on the "fast traffic" portion of the road is criminal prosecution, a state of affairs which offers admirable opportunities for patrolling district board peons to extort money, and often the innocent suffer as well as the offenders. This is, to my mind, an unhealthy state of things which has an ill effect on the agriculturists.

I consider that more of the road cess money should be spent on inter-village communications and that carters should be permitted to travel on any portion of the road they wish.

QUESTION 5.—FINANCE.—(*a*) The better financing of agricultural operations and the provision of short and long term credit to cultivators can best be achieved by the extension of the co-operative movement.

(*b*) No, I do not wish to suggest that cultivators should make fuller use of *taccavi* loans, but that where co-operative societies exist, *taccavi* loans should be given through the societies.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) I consider that the main causes of borrowing are thriftlessness and extravagance.

(ii) The source of credit is land.

(iii) I consider the reason preventing repayment to be the fact that the borrower cannot, in the vast majority of cases, liquidate his debts by instalments.

(*b*) As the Commission is not to hear evidence on the existing system of land ownership and tenancy, I can offer very little advice for lightening agriculture's burden of debt; I consider, however, that a mortgagee or creditor of any kind should be bound to accept part repayments of the debt, if tendered by the debtor.

(*c*) No, I do not think any restrictions should be placed on the credit of the cultivator but I consider that it should not be permissible for a creditor to execute a money decree against a man's landed holding and that this should be allowed only in case of a mortgage. I do not think that non-terminable mortgages should be prohibited.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*b*) There is every obstacle in the way: creeds, castes, conservatism, distrust and many others. Consolidation of holdings appears to me to be quite impossible although very desirable.

QUESTION 8.—IRRIGATION.—(*a*) (i), (ii) and (iii) I am of the opinion that the whole of North Bihar would benefit by irrigation where possible, but not in the manner suggested, for to meet the demand an enormous area would have to be turned into wells, tanks, etc., which seems to me not to be feasible. The only practical method I believe to be by pipe lines from rivers with pumping stations.

QUESTION 9.—SOILS.—(*a*) (i) Improvement of soils can be effected by better methods of cultivation, the more extensive use of farm-yard manure, by artificial fertilisers and by drainage.

(*b*) (i) and (ii) Yes, I have known instances of marked improvements due to silt deposit by flood water, and marked deterioration by flood erosion.

(*c*) I would refer to the answer given to Question 2. There are great possibilities of reclaiming vast areas of land which are situated in the declivities of the country adjacent to rivers that remain perpetually inundated, by draining these lakes into rivers where possible. In my part of the country, for instance, if only two of the lakes were drained into the adjacent rivers whose beds are lower than those of the lakes, many thousands of acres would be reclaimed and would be culturable for a rich winter crop each year. Government could have the land surveyed and, where the scheme is practicable, acquire a narrow strip of land from the lake to the river, dig a drainage canal and impose some form of tax on the reclaimed land to redeem the expense incurred.

QUESTION 10.—FERTILISERS.—(*a*) and (*c*) Yes, greater use can be made of natural manure and artificial fertilisers by encouraging the cultivator to apply the same to his land. This object can be achieved by demonstration farms and general propaganda.

(*d*) Dowlatpore.

(*f*) The only method, I know, and which I have adopted myself, is to buy cowdung. I have done this for the past three years and richly manured my lands at a minimum of cost. The larger landholders are now emulating me and the consequence is that much of the cowdung which used formerly to be burnt finds its way on to the fields. I believe this is the only estate in Bihar where this practice is in force. I consider, and I think it is generally admitted, that cowdung is the finest fertiliser known and as this exists in almost unlimited quantities here and elsewhere, it strikes me that it would be a lucrative enterprise to purchase cowdung, reduce it to powder form and use it where there is a demand for fertilisers. This is merely an idea of mine. However, of one thing I am convinced, and that is that if cowdung were marketable it would not be burnt.

QUESTION 11.—CROPS.—(*a*) (i) Better cultivation and manuring.

(ii) and (iii) Yes, the introduction of new crops and the distribution of seed is very essential and can best be undertaken by Central Co-operative Banks.

(*b*) Yes, the Pusa wheats; but heavy yielding food crops must have well-cultivated and rich soil, otherwise the heart is taken out of the land in the first year, with the result that the succeeding crops are more or less a failure. For this reason it is wiser to leave the local cultivator to continue with his present crops until such time as he is a little more enlightened.

(*c*) The Co. canes have almost entirely supplanted the indigenous varieties.

QUESTION 12.—CULTIVATION.—(i) See Question 14.—Implements.

(ii) Rotation:—

(*a*) Maize followed by *rahar*.

(*b*) Maize, wheat or barley.

(*c*) Fallow six months, followed by chillies and tobacco.

Then the cycle is repeated.

QUESTION 14.—IMPLEMENTS.—(*a*) Yes, I suggest that an iron mould-board plough should be introduced to supersede the ordinary plough in use.

(*b*) The steps necessary to be taken are: the supply of these ploughs on the hire purchase system, an organisation to meet the demand, blacksmiths' and carpenters' shops in rural areas to undertake all the necessary repairs, and selling agencies for the sale of spare parts.

(*c*) The only agricultural implement which is on the market is the Indian hoe which can be readily obtained from any Indian bazaar. Up to date no agency exists in this locality for the supply of iron ploughs.

QUESTION 15.—VETERINARY.—(*b*) (i) Dispensaries are under the control of the district boards. The system works well enough but the service appears to be understaffed. In this connection I would refer to answer to Question 4 (*c*).

(*c*) (i) As veterinary dispensaries are situated at great distances from the interior, full use is not made of them by the general public. The only suggestion I can make is that the staff should be increased and that such staff should do more touring.

(ii) Touring dispensaries, to all intents and purposes, do not exist in this part of the world, or if they do exist they are never met with.

(*d*) The only obstacle encountered in dealing with contagious disease is superstition. I advocate legislation as to animals exposed to infection. Failing legislation I can suggest no remedy.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i) I consider that the breeds of livestock could be improved by the purchase and maintenance of pedigree bulls by certain centres. For instance, all guaranteeing co-operative unions could afford to purchase and maintain such bulls out of their profits and so could Central Co-operative Banks. A scheme of this kind, I feel sure, would tend in time to improve the quality of the livestock.

(*b*) (i) There are practically no common pastures in this locality; the livestock lead a hand-to-mouth existence, and are, therefore, generally emaciated.

(ii) There is a complete absence of enclosed pastures.

(*c*) Fodder shortage exists from December till the middle of March.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) I would estimate the number of days' work done by an average cultivator on his holding to be approximately two hundred in the year. In the slack season he is, to all intents and purposes, unemployed.

(*b*) I would suggest that cottage industries such as weaving, basket-making, etc., be established with Government aid to occupy the spare time of the agriculturist and his family.

QUESTION 22.—CO-OPERATION.—(*a*) (i) An adequate staff should be maintained for the propaganda and development work of the movement. The present staff maintained by Government hardly have any time even for the inspection work. Their time is taken up mostly by the test audit of societies. My experience in this connection relates to Bihar and Orissa.

(ii) Non-officials taking part in the movement should be encouraged by Government in every way possible. The *panchas* of village societies should be given the status of the panchayat under the Panchayat Act of the Government; I mean, they should have legal status to decide petty disputes, not of the members of the society only, but of all the residents of the village in which the society is located. If this is adopted, every villager will be anxious to be admitted as a member of the village society and the society will thus be a real centre for all improvements.

(*b*) (i) In Bihar and Orissa the credit societies have been a partial success. The reasons for their not being a complete success are that the instalments of repayments are so fixed that it is not possible, in the ordinary course of events, for a man to pay off his instalments regularly out of his income, after meeting his requirements. For instance, loans for redemption of old debts are fixed as repayable in five instalments. My experience is that a borrower cannot, as a rule, repay the loan in instalments so fixed, out of the income of his land. It can be repaid if the loan is fixed as repayable in twelve instalments. Under the present system, either he defaults, or has recourse to outside *mahajans,* or sells off the whole of his produce to meet the instalment, and then borrows during the whole year for his subsistence. Besides, the rate of interest chargeable is fifteen and five eighths per cent, which is very heavy for a ryot to pay. Steps should immediately be taken to lower the rate of interest on loans.

(ii) While the village *mahajan* is the master of the ryot, there is open to the ryot only the alternatives of taking on credit whatever seed, cloth, cattle and food grain the former may be pleased to sell at his own price, or of buying for cash elsewhere the worst quality of every article, at exorbitant prices. It is of little advantage to buy the same article at the same fanciful price with the help of a loan from a co-operative society; the remedy is to buy from a wholesale trader and to give a joint order for the goods. This can be done if purchase societies are started in every village with a central organisation at the headquarter station of a Central Bank. Purchase societies for agricultural implements, seeds, and manures are of immediate necessity for any agricultural improvements that may be under contemplation.

(iii) The present system of agricultural marketing requires thorough overhauling. It does not yield to the cultivator any legitimate return for his labour and capital. Well organised middlemen step in between a mass of unorganised producers and the market and swallow up all the profits. An ordinary cultivator is under the oppression of the *mahajan* and dealer combined in one person who has unlimited opportunities of increasing his profits by all sorts of questionable methods. The only organisation which can effectively meet the problem is a society formed for the sale of produce or stock, and until we can set up an organisation of that kind, the co-operative movement must be considered to be only a partial success. This is one of the means of uplifting the rural population. Of course, co-operative marketing is not an easy thing to organise and manage; it has its pitfalls like all other organisations, and it requires a careful study of the existing conditions of the business. In starting such an organisation the first object should be to concentrate attention on one or two major products of a locality and not make it a general produce-selling business. The narrower the scope to begin with the better, for it will enable the organiser to study the market, and to control the supply effectively. The usual course of development is to start a number of small organisations and then to federate them into bigger ones. I think we should start with a central organisation covering the area of a Central Bank, and after making some progress, and accustoming the people to the operations of the society, form small local organisations and affiliate them to the central one.

(iv) Societies of this nature should be organised where large tracts of land are flooded each year. Rates of interest on loans to such societies should not exceed the bank rate. In this connection, I would point out that under the present Co-operative Societies Act, No. II of 1912, a co-operative society cannot spend more than ten per cent of its profits on the development side of the movement. If the

Act were so amended as to empower the societies to spend twenty-five per cent, with a maximum of fifty per cent for such development works, some real benefit would be derived. The societies should further be authorised to incur such expenses, with the approval of the authorities of the Central Bank, instead of the Registrar, as at present. It ordinarily takes months together to get the sanction of the Registrar and by that time, in most cases, the need has passed.

(v) This is not possible.

(vi) Purchase societies mentioned under (ii) would serve the purpose.

(*d*) They have been a partial success but if the suggestions under (*b*) (i) were given effect to, the success would be greater.

Oral Evidence.

65,043. *The Chairman.*—Mr. Atkins, you are of the Dowlatpore Agricultural Concern?—Yes.

65,044. Are you the owner of this concern?—No, I am not. It is the property of Messrs. Begg Sutherland, Sugar Manufacturers.

65,045. With regard to your answer to Question 3, has the introduction of the improved varieties of sugarcane made a great difference to the industry?—Yes, it has made a very great difference. As I have pointed out, it has increased the yield, as compared to the indigenous varieties grown by the tenants, at the lowest estimate by about a hundred per cent.

65,046. Would it be too much to say that the introduction of these canes has in some areas saved the industry?—It has saved, I think, the Samastipur Sugar Company and most probably other sugar companies of which I have not much experience. But certainly it has been the salvation of the planters in my locality.

65,047. Judging from this note of yours, your own work brings you into close personal contact with the cultivator?—Yes.

65,048. In your experience has the cultivator been a little over-conservative in the matter of adopting these improved varieties?—No, I do not think so. If you demonstrate to him the possibilities of the cane he at once takes to it, because it is absolutely certain that these canes are far superior to the indigenous varieties.

65,049. In your experience, is the cultivator frightened of the idea of trying a new cane?—I do not think he is frightened of trying a new cane once he sees what it can do; but it has first got to be shown to him.

60,050. What have you to tell the Commission about the propaganda service of the Agricultural Department? Do you think their services are reaching the cultivator?—No; I do not think they have got enough men to tackle the job; but it is very important.

65,051. Have you any criticism to offer of the Agricultural Department or of the officers carrying on propaganda?—No; I do not think I have, except, as I have stated here, that to all intents and purposes they do not exist, because there are not enough men and there is not enough money.

65,052. You think they do their best?—Yes, more than their best. They do extraordinarily well.

65,053. I understand that you have had considerable experience of co-operative credit societies?—Yes.

65,054. Do you regard co-operative credit societies as the most hopeful means of dealing with the indebtedness of the ryot?—Yes, absolutely. As I have pointed out in my note, I think the rate of interest charged is rather high.

65,055. Before you can hope to lend money at a substantially lower rate of interest you have to be pretty certain of re-payment in full at the proper time, have you not?—I do not quite follow what you mean.

65,056. I will put it in another way. In a society with which you are familiar is there much unpunctuality in repaying?—No, very little; the legislation of the country is so powerful that a bad debt, taking the Central Bank for instance, is almost unknown. To my knowledge a Central Bank has never yet been put into liquidation.

65,057. How do you think a lower rate of interest could be financed?—There should be direct transactions with the Imperial Bank. At the present moment, before the cultivator gets his money the Provincial Bank makes a profit out of it, the Central Bank makes a profit out of it, the Co-operative Society makes a profit out of it, and then it gets down to the ryot. He has got to pay all these profits before he can get a loan. I think the Government of India Act II of 1912 should be amended. At the present moment there are large numbers of societies in existence which have sufficient money in reserve to meet their working capital, but they are not permitted to utilise it in that way; they have to take shares in the Provincial Bank and the Central Co-operative Bank, which to my mind is very bad indeed. Furthermore, a co-operative society cannot in any way derive any benefit from its reserves unless it goes into liquidation, and therefore that means that if a society has a reserve of about Rs. 2,000 and its working capital is Rs. 2,000 the best thing it can do is to go into liquidation, use its reserve for some public benefit and then reform itself into a society; it is a ridiculous state of affairs, I think.

65,058. Looking for the moment at the existing co-operative system, do you suggest the elimination of one or more of the existing steps between the lender and the primary society, or do you suggest the extinction of the profit?—I think both. That is an economic question about the steps. I do not know how that would affect the credit. But I certainly think that a society which has got a large reserve should be allowed to use that reserve and thereby reduce the interest which is being charged on loans.

65,059. I am sure you realise the great difficulty of conducting any large business concern on the basis of absolute parity; you must make a slight profit or you are going to make a slight loss?—If a society has got a reserve capital of, say Rs. 3,000 and its needs are Rs. 3,000 in the year and it is made to invest that money in the Central Co-operative Bank or whatever it may be, drawing an interest of something like 6 per cent while the members are paying 15¾ per cent for their borrowings, that does not seem to be a good principle.

65,060. Do you attach great importance to the management of the primary society?—Yes.

65,061. Do you think it is essential that the primary society should examine the circumstances of each applicant for a loan?—Yes.

65,062. In your experience, is the management of primary societies, judged by those standards, satisfactory?—Yes, in the majority of cases.

65,063. Are societies capable of providing their own management or do they need supervision from above?—They need supervison from above as far as the accounts go, but not for their internal organisation.

65,064. Have you known instances where local moneylenders work their way into societies and succeed in getting control?—No, it very seldom happens.

65,065. Have you come across many cases of malfeasance?—Occasionally; human nature being what it is, it does take place at times.

65,066. Do you think that the cultivator is coming to have more and more confidence in the principle of co-operative credit?—Yes.

65,067. You think it is extending?—Yes.

65,068. Are you satisfied with the system of audit?—Yes. There is not enough time and the staff is not too big now.

65,069. Not enough time is spent on the business of examining the books of each society?—The audit is all right, but they want more organisation; they want to do everything possible to make the movement spread. At the present moment the co-operative movement is very small, taking India as a whole.

65,070. Do you find that membership in a co-operative credit society alters the whole outlook of the cultivator?—I do not think it alters his outlook so much as saves him from a state of penury.

65,071. But would you agree that the educative value of the co-operative movement is at least as important as its purely economic aspect?—I think so, certainly.

65,072. In your experience, are the best means being taken to exploit the educative possibilities of the co-operative movement?—No, I do not think so at all.

65,073. Do you think the ordinary member is instructed in the principles of co-operation?—Yes, up to a point; but there are vast possibilities of educating the cultivator, which I give in my note, which are not taken advantage of at all.

65,074. In this district what is the next grade above the primary society in the organisation: district banks?—Guaranteeing unions.

65,075. Do they hold annual meetings?—They hold monthly meetings.

65.076. In the vernacular?—Yes, all in the vernacular.

65,077. Have you attended those meetings?—Yes.

65,078. Are they well conducted?—Yes.

65,079. So that in your view, I gather, the movement on the whole has helped in the district with which you are familiar?—Yes.

65,080. Under the heading 'Fertilisers', you say that the only method you know and have adopted is to buy cowdung, that you have done this for the past three years and richly manured your lands at a minimum cost. Have you succeeded in persuading the cultivator to sell this cowdung after collecting it?—It is a very difficult thing to start anything new in India, and especially in this part, but as the result of continually persuading them, (I started about three years ago) now I have so much of this cowdung put up for sale that I have to turn it away; I have manured the whole of my cultivation and I find there is a surplus.

65,081. Do you get it sufficiently fresh?—Yes; as well as cowdung there is a good deal of village and street sweepings and refuse, which is all of value to the farm.

65,082. Do you mix it with straw?—No, I put it on the land as it is.

65,083. As you get it?—Yes, it is put on to the land, then the cart loads are counted and we pay on that.

65,084. How many acres do you manure with cowdung in this way?—About six hundred acres.

65,085. At what do you estimate the total weight of the cowdung used?—The six hundred acres are manured at the rate of twenty cart loads per acre, and each cartload weighs about ten *maunds*. That makes a total of 120,000 *maunds* or nearly 4,300 tons.

65,086. Is that drawn from a very large district?—No, from a district of about eighty or ninety square miles.

65,087. What do you pay for it?—It depends on the load, because cowdung brought from different villages is paid for at different rates, but it works out at approximately ten annas a cart load; that is just about an anna a *maund*.

65,088. Do you notice a marked rise in the fertility of the land that you have been manuring with cowdung?—Yes, certainly.

65,089. What manure were you using before you got this cowdung?—I was using the farm-yard manure which was obtained from my own cattle, and green manuring, with superphosphates.

65,090. Are you still using superphosphates?—No, because I find that cowdung is good and more economical.

65,091. Are you still using green manure?—On a very limited scale.

65,092. Do you find that cowdung gives you practically all you want?—Yes, everything.

65,093. Do you judge that the cultivators have managed to supply you with this without depriving themselves of fuel?—No, I do not think so; I think they deprive themselves of the fuel. Cowdung in this part of India is utilised mainly in the cold months of the year for the fire, not for cooking purposes; so that they remain cold at nights and sell their stuff to me instead.

65,094. Is it your suggestion that it might be possible to save the cultivator from the practice of burning cowdung if you bought the cowdung from him, powdered it, and sold it back to him?—No, I did not mean to imply that at all, because he would not buy it back. The people who collect the cowdung are old women and young children, and so on, who have not got any land at all.

65,095. They get it off the roads and the cattle-grazing places, and so on?—Yes.

65,096. You do not get it from the ordinary good cultivator?—No, not what remains on his fields; the droppings are taken by him; but what can be got on the roads and pastures can be gathered.

65,097. Do you think there is any hope of persuading the cultivators in this district to grow any fodder crop?—I fear not: not anything more than they grow at the present time.

65,098. Their need of money crops is so great that they would not forego those?—No.

65,099. So that you see no way out of this difficulty?—No way out of it at all; we are over-populated and over-stocked with emaciated cattle.

65,100. Are there any rural betterment societies on a co-operative basis in your district?—None at all.

65,101. That is a direction in which you would like to see development?—Yes, certainly.

65,102. What view do you form of the drinking-water supply of the villages? Have you ever examined that question?—I think it is very bad; the type of well that exists is conducive to all kinds of contamination.

65,103. What type of well exists?—The ordinary well without any guard to it.

65,104. Not the step well?—No.

65,105. You mean the sort of well into which the water drains back if any is spilt on the edge?—Yes.

65,106. Do you think that is a direction in which an effort should be made to improve the conditions in which people live?—Yes, I think legislation on that point would be advisable, to the effect that a man should not be able to put up a new well except of a stereotyped kind.

65,107. You would make it apply to new wells but not to old?—Yes; I think it would be difficult to make it apply to old wells, because nobody owns old wells, but a man who constructs a new well could be compelled to make a sanitary well.

65,108. Do old wells last for ever, or would your suggestion in time bring about an improvement in the type of wells?—I think so, because old wells do not last for ever; they fall in and have to be repaired, and I suggest that no old well should be repaired unless it was according to a certain plan.

65,109. *The Raja of Parlakimedi.*—In your statement you say that a great deal of corruption exists among railway stationmasters, resulting in untimely supply of wagons to ryots?—Yes.

65,110. Has any complaint been made to the authorities?—Yes, we have complained, mostly verbally by seeing them, but with no result whatever.

65,111. Do these complaints go right up to the top?—I do not know; it is generally with the District Traffic Superintendents that one deals.

65,112. Is no notice taken even of written complaints?—No.

65,113. Then is it hopeless to attempt to make any improvement?—No, I do not think it is hopeless; I think it is possible with the Government stepping in and making it unpleasant for these railway officials who do it. They are very autocratic; it is very difficult to get any good result out of complaints to railway officials, I find.

65,114. Have you on any occasion made a complaint to the authorities?—Yes, I am sure I have.

65,115. Did they take any notice of that?—No, the only thing that happened on that occasion I think was that the stationmaster was transferred.

65,116. Was the new man any better?—No, he was just as bad.

65,117. Then you speak of the condition of the roads?—Yes, that is a very important thing; I lay great emphasis on it; everybody likes to have good roads, and I think the fact that the roads are in such a disgraceful state for the bullock cart traffic militates against the cultivator getting the best prices for his produce.

65,118. Under whose management are the roads now?—Under the district and local boards. In some areas, as I say, the villages are entirely isolated for many months in the year.

65,119. Owing to lack of communications?—Yes.

65,120. What prevents the ryots from becoming members of those boards?—One has to be elected a member, and the ordinary ryot has not got enough influence, or he does not care very much about it. It is generally the landlords and the gentry of the place, who own motor cars, who are members of the district boards, and they naturally want good roads for themselves.

65,121. But some of the wealthy ryots are rich enough to stand for election, are they not?—Yes, some of them are.

65,122. Especially the village *munsiffs*?—Yes, but, as I say, they are landlords and the gentry of the place; they get in.

65,123. Do they ever attempt to safeguard the interests of the ryots in that direction at all?—No, I think there has been no movement in that direction at all; I think it is because they want to travel in comfort themselves.

65,124. Have you ever attempted to speak to the ryots with a view to their trying to return somebody who would safeguard their interests?—No, because I am afraid that even if they did they would find the majority against them on these boards.

65,125. It is different in other parts of India?—Yes, I know it is quite different in other parts of India.

65,126. For instance, there are a large number of ryots on my local board, and the interests of the ryots are well safeguarded?—Yes. I think in my district the ryots have their interests safeguarded to a certain extent, except in regard to roads.

65,127. Is there a copious supply of fuel in these parts?—Yes, there is quite a good supply of fuel for the needs of the cultivators for cooking purposes.

65,128. Where is the supply got from? Is it got from tops and the like?—Yes, from small tops and twigs and also from the stalks of maize, stalks of *rahar* and that sort of thing. They burn these things and it meets the demand.

65,129. There are no plantations for the supply of fuel?—I think not. I do not think, however, that it is a serious public need at all.

65,130. Do you not think that there would be more material available for manuring if plantations for the supply of fuel were encouraged?—I have never given serious consideration to that aspect. Perhaps it would, but I do not think that it is possible, with the congestion of humanity that exists in this part of the world.

65,131. There is still a great deal of open country, that is, uncultivated areas?—Yes, but they are a long way off from the villages, and then again the freight would be prohibitive for the ordinary cultivator.

65,132. What about the medical aid which cultivators receive? Is it sufficient?—I think that it is extremely insufficient at the present moment. Where I live there happens to be a town which has a municipality and the only dispensary in the locality, and they treat, I think, 25,000 cases a year and spend about Rs. 600 on medicines. So that each patient must get very little in the way of medicine.

65,133. Are such dispensaries run by the local boards?—This dispensary is run by the municipality.

65,134. Do they get any contribution from the district board?—Yes, a very small contribution.

65,135. So that, in this direction, the district board does not show sufficient interest?—No, the attention is very inadequate and in my opinion it is a scandal.

65,136. What about education? Do they show any interest in that line?—Yes, education is spreading considerably by the aid of co-operative schools.

65,137. Up to what standards do they teach in these co-operative schools?—The teaching is very elementary, being up to the primary standard.

65,138. Does the district or the local board contribute anything towards their upkeep?—No.

65,139. Where do they get the funds from then?—From the ten per cent profits of the society.

65,140. Do you know of any case where a society has applied for help?—Yes. It is a very difficult thing to get any help out of the district boards for education in connection with co-operative schools. I have tried it myself but failed.

65,141. *Sir James MacKenna.*—What is the local custom when a district or local board road passes through a sugar or an indigo estate which is privately owned?—If it is a privately owned estate they can prohibit all traffic.

65,142. What I mean is, where you have part of a public road running through an estate, what is the arrangement as to upkeep?—They are now all repaired by the district or local boards under contractors.

65,143. Is that a new custom?—Yes.

65,144. What was the old custom?—The old custom usually was for the indigo factory to maintain the road.

65,145. Did they get a grant from the district board for the purpose?—Yes.

65,146. And were the portions of the road inside the estate better than those outside?—Very probably.

65,147. That is to say, the planters spent a little more than they got?—Yes.

65,148. When you say that you are not entirely satisfied with the services rendered by the Agricultural Department, do you refer to the Agricultural Department of the Government of Bihar and Orissa?—Yes.

65,149. What is the attitude of the residents on this side of the river to the Agricultural Department? Do they look to the Imperial Department at Pusa for help or do they look to the department of the Bihar Government?—Well, they look to Pusa, as a matter of fact, because the other department is so far removed from here that they never hear of it.

65,150. If you had an agricultural problem where would you go?—I would go to Pusa.

65,151. Do you expect Pusa to carry on local propaganda and demonstration just as a provincial department would do?—Yes, I think it would be very useful.

65,152. It would be useful, but would it be expedient from the point of view of the central research institute of the Government of India mixing itself up with work which should properly be done

by the local department?—Well, I think that it should to a limited extent. There are wonderful ways of doing propaganda work, and we have got here, in this part of the country, European planters who follow up the advice which Pusa gives them and that I consider is a very fine advertising agency.

65,153. Do you think that the work of the European planters has an effect on the cultivators in the neighbourhood?—Certainly. This is especially the case with regard to canes. Next year I suppose there will not be any canes of the indigenous variety left.

65,154. *Professor Gangulee.*—We have been told that the Indian ryots are exceptionally conservative but, as you said, if the example is shown to them by the European planters they readily take to Coimbatore canes?—Yes. And also it is not just ordinary example; there must be a little bit of propaganda work and things have been so arranged in this part of the world that the planter gets a royalty on canes which are produced from his area and it is to his interest to get the ryot to grow the cane.

65,155. So then it is not merely a question of example; it is also intensive propaganda on the part of the European planters?—Yes.

65,156. What is the nature of the propaganda they do?—Personally I have held meetings in villages and I have distributed pamphlets by the thousand and also conducted field demonstrations.

65,157. Were these meetings well attended?—Yes.

65,158. Are these pamphlets in the vernacular?—Yes, chiefly dealing with Coimbatore canes. The pamphlets are useful and well read.

65,159. So that illiteracy is not at all a handicap in that case?—No.

65,160. You have found out that it works well?—Yes.

65,161. Would you tell the Commission what assistance you have received, if any, either from the department at Pusa or from the Bihar and Orissa department?—We have obtained help from Pusa in the cane which I grow. That has helped the European planter to develop in many cases and now cane is being grown extensively by the ryots and they are also sharing in the spoils.

65,162. So, with regard to the variety of cane, you have benefited greatly by the help of the Agricultural Department?—Yes.

65,163. And in methods of cultivation?—I do the ordinary ploughing, keep the land fallow for a year and then plant cane and then keep it fallow again, after which I manure the land and then grow cane again. I have done that regularly for the last four years and I have got the finest crop that I have ever seen on my land at the present moment.

65,164. Is any new manure being introduced?—No. I have tried experiments, but they are not conclusive yet. So far I have stuck to cowdung.

65,165. Has any manure been suggested by the Agricultural Department and have you found that successful?—Yes, it has been successful, but I find that I can get my results at a smaller cost from the refuse that I can buy locally.

65,166. You have an abundant supply of cowdung?—Yes.

65,167. I take it that your experience of Indian agriculture is confined to this Province?—Yes, entirely.

65,168. Could you tell the Commission what definite change or changes you have noticed in the practice of the cultivators, say, during the last ten years?—Changes are very slow in India, but I have noticed one change, which is that they are now adopting the iron plough. That was not suggested by the department, but was introduced by the planters themselves. As a matter of fact it was originally suggested by the department, but we modified the type of plough suggested because it was a little too heavy for the local draught animals.

65,169. So that the credit for that goes to the planters?—Yes. Then there is the introduction of better-yielding wheats and more prolific canes and things of that kind.

65,170. Is it your opinion that there is a demand for agricultural education?—There is no demand now because they are completely ignorant of it, but the demand would arise as soon as they could be made to see and realise the benefits of it.

65,171. In other words, the demand has to be created by stimulating their interest?—Yes.

65,172. You make a very interesting suggestion to the effect that the co-operative movement should take part in the dissemination of knowledge. Have you any experience of the co-operative movement in this Province?—Yes, I am chairman of the largest co-operative bank in the Province.

65,173. Are you in touch with the primary societies?—Yes.

65,174. Is this co-operative movement a people's movement?—Yes, it is entirely self-governing. They have been educated to such an extent that the whole thing lies in the hands of the Board of Directors the members of which are all Indians with the exception of myself, and I do not do very much administrative work because it is better for them to run their own show. I simply give advice and counsel to them.

65,175. These are chiefly credit societies?—Yes.

65,176. Are there any other activities emanating from this movement?—Well, the only activity which has emanated therefrom is the fact that it has made the people less indebted and has increased their well-being financially.

65,177. Have you no sale society?—No.

65,178. No educational movement?—Yes, they are starting a school.

65,179. Could you tell us the amount of road cess that you get from this Province?—I cannot tell you exactly, but it goes into many lakhs of rupees. The amount payable by a ryot is half an anna in the rupee according to his rent, and half an anna is paid by the landlord. It comes to one anna in the rupee, paid by both parties.

65,180. Have you any idea as to how the money from the road cess is spent at the present moment?—It is spent on roads to a large extent.

65,181. Is it earmarked for road improvement?—I think so; it is also utilised for wells and other things of general public utility.

65,182. So the district boards have the question of better roads well in view, but still there are not adequate roads in the district?—The money is spent chiefly on main roads and not on inter-village communications.

65,183. Judging from the success that you had in the introduction of Coimbatore canes, chiefly through the efforts of the planters,

I gather there is a great deal of scope for adult agricultural education in your Province?—Yes.

65,184. Has the co-operative movement taken part in that?—No, the reason being that we are not allowed to spend the money which is available.

65,185. Is there any great scope for irrigation in this Province?—Yes, I think so.

65,186. Is there scope for well irrigation?—I would not advocate well irrigation or tank irrigation because it would mean that half the countryside would be utilised in making wells and tanks, but I would suggest pipe lines from the rivers, with pumping stations.

65,187. Do you lend money to the ryots?—No. I give out cane advances, that is all.

65,188. Do you give them fertilisers?—No.

65,189. You give them only cane setts on the condition that they supply you with cane?—I make no condition, but they generally do.

65,190. To what extent does the village *mahajan* still dominate the village?—Where there is no co-operative society, he dominates it a great deal. He gets large sums of money out of the ryots dishonestly, and so on, and he is a power in the village.

65,191. Are you in touch with the Department of Agriculture in Bihar and Orissa? Do you meet the Director of Agriculture?—I am in touch with him to a very small extent because he lives in Ranchi and that is a long way off. We are not in as close touch with him as we are, for instance, with Pusa.

65,192. He has never paid a visit to your agricultural concern?—He has not yet paid a visit, but I hope he will one day.

65,193. *Mr. Calvert.*—In your note you suggest that the Co-operative Central Bank might take control of agricultural education. Are these Central Banks directed by people who are in sympathy with the rural classes?—Yes.

65,194. Do you think they would select the teachers you would like them to select?—Yes.

65,195. You know the roster system on railways. The stationmaster is supposed to maintain a roster on which all applications for wagons are entered in turn and the wagons are supplied according to that order on the roster. I gather that system has proved a failure?—It does not work. I do not think it is in operation at all. It is entirely within the stationmaster's power to allot wagons to whomsoever he likes; he lays down his own rules.

65,196. We have been told that it is a perfect arrangement?—Nothing could be more imperfect from the public point of view.

65,197. You suggest that if *taccavi* is distributed it should be given through co-operative societies?—Yes.

65,198. Do you not think there will be trouble in recovering the money, because Government possess special powers of recovering which the co-operative societies do not?—The co-operative societies do possess that power. They have got a specific procedure under the local Act, in the same way as the Government have.

65,199. With regard to the question of redemption of loans, is there any difficulty raised by the mortgagee if the mortgagor wishes to redeem his mortgage?—There is a very serious difficulty, because the debtor is not allowed to pay off his debt in instalments. He must pay the whole amount.

65,200. And if he wants to redeem he has to bring a regular suit?—Yes.

65,201. Would you like to see some Act empowering him to redeem his mortgage?—The man who is in debt is not permitted to liquidate his debt in small instalments. But if he were permitted to do that in the same way as they do in the case of co-operative societies, it would facilitate his getting out of debt in due course. If he borrows Rs. 100 he has never with him Rs. 100 to pay it back. What he does is to borrow Rs. 100 to pay back this Rs. 100.

65,202. When he has this Rs. 100, does the mortgagee put obstacles in the way of its payment?—He does if the loan is a satisfactory one.

65,203. Does the cultivator want work in his slack season or is he content to be unemployed?—I do not think he minds his unemployment very much. At the present moment he has got no work and he is quite happy to sit idle, doing nothing or next to nothing. He attends to his cattle and that kind of thing.

65,204. With regard to this question of co-operation, I think in answer to the Chairman you were referring to some local ruling requiring the reserves of primary societies to be invested in the Central Bank?—What I was referring to was the fact that a society is not permitted to spend more than ten per cent, of its profits. That is according to an All-India Act.

65,205. Is there a local rule which says that the whole fund must be invested in the Central Bank?—That is the provincial Act.

65,206. You would like to see, if possible, every primary society utilise those reserves in its own business, as is the case in other Provinces?—They have got a board of directors for every society which is affiliated to a guaranteeing union. The guaranteeing union has also got its board of directors and the guaranteeing union is affiliated to a Central Bank which has also got its board of directors. If all these boards of directors wish to spend their monies in a certain way, I think it is very hard on them not to be permitted to do so either by the Registrar or by the Government. They ought to have control over fifty per cent of their reserves.

65,207. Do you think that could be done without risking the stability of the societies?—I certainly think it could be done and it would make the movement very much more popular.

65,208. It will rather tend to lower the reserves?—The reserve will have fifty per cent of the amount that goes in to build it up year by year. These reserves are so big in some of the societies that they need not borrow a single *pie* from any outside body, but they are not allowed to get any benefit from them. Why should they not be allowed to spend that reserve on, say, improving the village sanitation or building wells or things of that kind?

65,209. Would you give them that extra power, from ten per cent to fifty per cent straightaway, or would you confine it to a society of ten years' standing?—I should say that where the society's reserves are equal to its working capital, it should be given that power. The stability of the society is in no way seriously affected, because you start a society on the stability and the credit of its land. The society has no reserves when you first start it.

65,210. *Mr. Kamat.*—You suggest that agriculture could be made attractive to middle class youths if Government lands were given in allotments for such use and also if Government aided them financially?—Yes.

65,211. I would like to ask you about the financial aspect of your proposal. It is a question of finding fertile lands and of finding finance; do you agree with that?—Yes.

65,212. Now, you are managing or cultivating an estate of something like 1,600 acres?—Yes.

65,213. For these allotments to middle class youths I presume you mean smaller allotments than such vast estates?—Yes.

65,214. What size of allotment would you propose?—I should think that for a middle class youth in this part of the world a ten acre plot would be attractive.

65,215. If it were to be a ten acre plot, do you think it would be an economic size for these middle class youths to manage?—Yes.

65,216. Can they make money out of it if it is only a ten acre plot?—I am judging the quality of the land according to the quality of my own land; it depends on the fertility of the land; if the land is less fertile than it is in this part of the world, which it is as a rule, then perhaps a bigger plot, say, of fifteen acres, will be better.

65,217. *Professor Gangulee.*—Assuming that the crops are money corps?—Yes.

65,218. *Mr. Kamat.*—If it is less fertile, it is not worth while asking the middle class youths to go and cultivate such land?—The land in other parts of the country cannot be so fertile as it is in this very rich part of India. In that case, give him double the size He may be able to get an income of Rs. 100 an acre if the land be here, but in other parts of the country he may be able to get only Rs. 70 an acre. So all you have got to do is to double the area of land given to him.

65,219. Assuming, therefore, that the fertility is a normal one, and assuming further that they have, say, a ten acre plot, how many middle class youths would you provide for in a district?—It depends on the amount of land available.

65,220. Does it depend on the amount of land available or on the money available?—Both.

65,221. To make these ten acre plots an economic success, how much capital do you think, from your experience, would be necessary for these middle class young men?—That is a question I am not in a position to answer, because the conditions that prevail in the other Provinces are different from those prevailing in my Province. That question would have to be examined on the spot, I think, before it could be determined. But I do not think it will be very heavy.

65,222. Could you give me just a rough idea of the amount?—If a middle class youth could provide himself with a pair of bullocks and a plough, I think he could make a start on a ten acre plot with about Rs. 250.

65,223. You think he can make a decent living out of ten acres of land, with a capital of Rs. 250?—Yes.

65,224. Government are, according to your suggestion, to give this aid in a large number of cases?—They should start on a small scale, in an experimental way, to see how it succeeds, and if it proves successful go for it absolutely as hard as they can. We want to colonise these boys, and that is within Government's power, to my mind.

65,225. *Professor Gangulee.*—Have you adequate land?—Yes, but not in this part of the Province; you would have to settle them in outside holdings in different parts of the Province.

65,226. *Mr. Kamat.*—As you know, Government money is of course the taxpayers' money, your money and my money. Should Government venture Rs. 250 per boy, to a large number of boys if the boys have no experience of agriculture?—My suggestion is that you should start with approved lads only, who have had a certain amount of agricultural training.

65,227. I am not asking you about the training; I am concerned with the experience; mere training does not guarantee that a boy will make a success of the enterprise?—I think the Indian youth here of, say, twenty years of age has gained a good deal of experience of agriculture by simply seeing his father work his own land.

65,228. Do you mean to say that educated middle class young men cannot find Rs. 250 if they are confident that they can make some profit out of it?—First of all, the middle class youth does not know that he can get this land. He cannot get it. As a rule he has not got the enterprise in him, he has not got the push. You will require propaganda work to get these people and, I will not say drive them, but induce them to go out, and if you promise them Rs. 250 they will go out there, and it will be a success, to my mind.

65,229. Do you mean to say that a young man who starts on a course of agricultural education feels that he will get no land, if he wants to have it, or that he will not get capital?—He feels that he will not have the land, to begin with.

65,230. He thinks he will get the capital?—His father may have the capital, but he cannot get the land.

65,231. There is a dearth of land?—Yes, very much so.

65,232. Supposing you bring into agriculture (I do not want to use the word drive) a large number of these middle-class young men, you may thereby increase the pressure of the population engaged in agriculture from seventy per cent as at present, to say, eighty per cent; will that be ultimately desirable in the interests of agriculture?—I certainly think so.

65,233. You think there would be no necessity to relieve this pressure, in order to make agriculture really paying?—No.

65,234. And people would really be able to make a decent living out of agriculture?—Yes.

65,235. You think there would be no hardship to those who are already engaged in agriculture?—No. I cannot see that any bad result can be derived from bringing uncultivated land into cultivation, and by inducing the people who are now looking for jobs on Rs. 20 or Rs. 30 as clerks to go back to the land.

65,236. You want to add to the agricultural population and increase it from seventy per cent to eighty per cent?—They are agriculturists now in a sort of way; their mainstay is from agriculture, but there is not enough land to go round; you relieve one portion which is overcrowded and put the surplus into another area which is uncultivated. I cannot help thinking that that is desirable.

65,237. By adding ten per cent to the seventy per cent now engaged in agriculture, will you be giving the eighty per cent a decent standard of living?—Yes, I think so.

65,238. *Sir Thomas Middleton*: You refer to the fact that heavy-yielding crops such as Pusa wheats, if cultivated on a soil which is not rich, take the heart out of the land in the first year?—Yes.

65,239. Have you seen this happen?—I have experience of it. I distributed Pusa wheats, and in my own locality I have seen what they have done. The ryots gave the land the same treatment as they gave it for their own food crops; in the first year there was a bumper crop of wheat, but the crop that followed was a failure, and for that reason they do not now grow Pusa wheat in my area.

65,240. What crops follow wheat?—Maize generally, and *rahar* or chillies, but chillies very seldom; generally maize and *rahar*.

65,241. When was the maize sown after the wheat?—At the break of the rains. The wheat is harvested in March and the maize is sown about June.

65,242. You have seen the effect on both maize and *rahar*?—Yes, I have had it myself. It is a peculiar thing that the Indian cultivator here will pay a great deal of attention to heavy-yielding crops such as tobacco, chillies and sugarcane; he will put all the manure that is available on to these lands, but for these food crops he is just content to plough the land, sow it, and hope for a return sufficient to feed him.

65,243. You say that fodder shortage exists from December to 15th March; what happens after the 15th of March?—The winter harvesting comes in then, and they have the straw to feed the cattle with.

65,244. Do the cattle get anything but wheat straw?—There are various other crops too

65,245. How do they feed cattle after the 15th of March?—On the straw of the crops that have been threshed.

65,246. How many pairs of plough bullocks do you require for the 1,600 acres of land under your management?—I have got thirty-five pairs of bullocks and four tractors.

65,247. How many pairs of bullocks are saved by a tractor?—No bullock is saved by tractors; even when we have tractors we still keep on the bullocks; you cannot altogether supplant bullocks by tractors, because there are certain jobs that you must do with bullocks. In the ordinary course of events we increased our cultivation a good deal, and that was the reason why we did not reduce our bullocks. It is difficult to compare the one with the other, because the work done by a tractor cannot be accomplished by any number of bullocks.

65,248. Could you cultivate the 1,600 acres of land under your management if you had nothing but bullocks?—No. Out of the 1,600 acres, I do not cultivate the whole of the land myself; a certain amount of that is let out on lease; it goes in rotation.

65,249. Will you tell us how you feed your own bullocks?—On silage, sugarcane tops, and mostly by oat straw and oats.

65,250. When they are getting straw and working hard, what allowance of oats do you give?—Two *seers* per day per head, and as much straw as they can eat, with a little bit of oilcake.

65,251. When oats are not available, is there any other grain to use?—Oats are always available with me.

65,252. *Dr. Hyder*: You have been a member of the Bihar Legislative Council?—Yes.

65,253. And you are, I understand, a member of the district board?—I am a member of the municipality.

65,254. You refer to the condition of the roads and you say that there is one road for motor traffic and another road for cart traffic. Would it make much difference if the traffic were interchanged, that is, if the motor traffic were transferred to the cart roads?—It would make a considerable difference to the motor traffic; I should think it would cease to exist.

65,255. You have a wide knowledge of the agricultural conditions in this part of India?—Yes.

65,256. It is suggested that, among other causes which prevent the cultivator from repaying his debt, one cause is his excessive use of *ganja*. That view is given in the evidence submitted by the Indian Association of Agricultural Officers. You cannot say from personal experience if it is right?—I cannot; I should not think that was the cause of it; it has never struck me.

65,257. You have an estate of about 1,600 acres?—Yes.

65,258. How much *peish cush* or Government land revenue do you pay?—I think I pay about Rs. 3,000 a year.

65,259. If I am not too inquisitive, how much do you make a year per acre on an average? If you do not wish to reveal the state of your finances, I do not wish to press you?—That does not affect my finances. I should think, on the average, there is a profit anyhow of about Rs. 40,000 in the year; if you divide it by 1,600, you will get the figure. That is the profit: the income would be different to that, on account of the overhead charges.

65,260. Can you tell me whether a large amount of money is spent in this district or in the neighbouring districts at the time of the elections to the district board?—If you are referring to money spent on elections, a great deal of money is spent.

65,261. *Professor Gangulee*: Have you had occasion to study the existing system of marketing of agricultural produce?—The only system that prevails is that the *mahajan*, as a rule, is the purchaser of the products.

65,262. Have you yourself studied this question?—No, I have not.

65,263. You could not supply the Commission with any definite information with regard to the existing system of marketing of agricultural produce in this Province?—No.

65,264. *Sir Henry Lawrence*: What is the rental value of an acre of land?—I pay to the landlord approximately Rs. 5-8-0 an acre; it varies from Rs. 5 to Rs 6.

65,265. What is the rate, if you let out your land to your tenant?—That, of course, varies; with me the rate is rather low; I let it out, on an average, for Rs. 30 an acre.

65,266. *The Raja of Parlakimedi*: It does not depend on the crop the tenant grows?—No, with me it does not. I believe that practice does exist in other parts; if you manure the land and the tenant grows tobacco or chillies, he has to pay a higher rent.

65,267. You do not follow that system?—No. I cultivate as much as I can do myself, personally; all lands that are not worth my personal attention, I let out.

(*The witness withdrew.*)

Mr. C. G. Atkins.

Babu GANGA VISHNU, Planter, Muzaffarpur.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) The research organisations identified with the welfare of the agriculturists, as they at present stand, require a good deal of supplementing to meet the increasing demands of an all round agriculturist country like India.

The scientific researches which have proved so beneficial in providing efficient varieties of seeds for the staple crops, in combating diseases and in diverse other ways are not carried on very elaborately because of the paucity of research centres.

To provide for the growing agricultural demands, I would suggest that each Province should possess a well-organised and efficient agricultural department having at least one representative in each *thana* of a district. In conjunction with this department, every Province should have a well-equipped research centre which should study and specialise in the particular conditions of the soil, the climatic conditions and other agricultural requirements of the Province I would like the works of these provincial research centres to be co-ordinated, supervised and directed by an Imperial institute like the one we have at Pusa.

QUESTION 2.—AGRICULTURAL EDUCATION.—(i) I do not think the supply, either of teachers or institutions, is sufficient for their purpose.

(ii) All districts with which I am personally acquainted suffer from a dearth of teaching facilities.

(iii) Yes, India is a country where even now hereditary professions flourish. Teachers drawn from the agricultural classes would soon learn their work and would prove to be more efficient in imparting their knowledge to people of their own class.

(viii) I consider school farms where practical demonstrations are carried out to be the one agency necessary and efficient for imparting agricultural education. At the same time, the instruction given to the students on these farms must be strictly vocational; the students must be made to cultivate land themselves and thus acquire practical knowledge of the agricultural operations in their different stages. These farms should form part of any middle vernacular school which happened to be stationed at the headquarters of a *thana* and should be maintained by the district board to which the school belongs.

(ix) I cannot speak of students who have received higher education, have graduated and thus require a fat berth to start with; but many students, who have received a course of training at some agricultural school or institute, either start on their own account or get employment with those who have big farms to look after.

(x) I think the attraction is just the other way. The economic conditions prevailing in the country, the difficulty of earning a decent livelihood, the increasing number of the middle-class unemployed, are factors sending people back to the land in very large numbers. Everywhere one finds the pressure on the land increasing day by day. This is evidenced by the high prices obtained for arable land. In Hajipur, a sub-division of the Muzaffarpur district, an acre of land has even fetched fourteen hundred rupees, though that is no doubt a record price.

(xii) The tenantry as a class in this country are always eager to pick up any morsel of knowledge or instruction which would enable them to get a better return from their land. They only require practical demonstrations, tried under cultivators' conditions, to adopt new and improved methods. For this purpose demonstration farms should be spread all over the country. This would also popularise adult education in rural tracts.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) Practical demonstrations accompanied by direct instructions.

(*b*) These demonstrations, to be effective, should be brought to the very doors of the cultivators. For this purpose I would suggest the establishment of demonstration plots in the ryot's own land and attaching plots to vernacular middle schools with an area and equipment sufficient for practical training.

(*c*) The tenants are sure to take expert advice if it comes within their means to adopt it and they have had a practical demonstration of its utility.

(*d*) I would mention the striking successes achieved in wheat and sugarcane by the supply of improved varieties and by practical demonstrations carried on in Pusa. They have revolutionised the cultivation of sugarcane. It is not many years since sugarcane was grown in these tracts only as a fodder and, on a limited scale, to make *gur* (raw sugar). With the advent of Co. 213 and 214, and other varieties suited for every description of soil and climatic conditions, and practical instructions for trench sowings and other details, one finds this crop extending on every side. Now the demand for seed at times exceeds the supply. The Sugar Bureau at Pusa has done yeoman service in spreading the cultivation of sugarcane and we all feel beholden to it for introducing this rich crop.

QUESTION 5.—FINANCE.—(*a*) Co-operative societies are providing a good agency for financing the agricultural operations of the cultivators. That these societies have not made rapid strides is due, in my humble opinion, to their inability to secure the sympathy and co-operation of the landholders. I need not enter into the causes which have led to this inertia of the landholders towards the co-operative movement.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) The main causes of borrowing are: The higher standard of life which the tenants now affect, their spendthrift ways, lavish expenses over marriages and other ceremonial occasions, as also their bent for litigation, which is the bane of this country. But then I must remark that the indebtedness is not so very general as premised in the question; it affects largely tenants who hold small areas of land. At the same time there are certain classes and castes of tenants in our parts, who are very smart in husbanding their resources and piling up their hoards and are becoming small landholders on their own account.

(ii) The sources of credit are their land, their ornaments and other movable property of value.

(iii) Their improvident ways and also the failure of crops.

(*b*) All three measures suggested in the question are useful, but, to me, the most efficacious seems to be the application of the Usurious Loans Act.

(*c*) Restricting or controlling the credit of cultivators, though wholesome in itself, is a measure which, I am afraid, will not prove expedient in the present state of the country as it would be pointed at

by interested parties as a further encroachment on their rights and freedom of action and would provide a ready handle for agitation.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) In my opinion it seems quite hopeless to stop fragmentation of holdings. The Hindu law of succession prevailing in these parts helps the sub-division; but the potent and primary cause is the right now being yielded to the tenants, under the pressure of case law, to partition or otherwise encumber their holdings. The legislatures are also inclined to give them the absolute right of alienating their holdings.

QUESTION 8.—IRRIGATION.—(*a*) In my opinion, irrigation constitutes the crux of the whole question of agricultural improvement. Water-supply is the principal limiting factor in crop production. Without the supply of water being assured I consider agriculture to be a speculation and not an organised industry. I would mention my own district of Muzaffarpur and its sister district, Darbhanga, where the tenants wistfully look towards the sky for opportune rains and a propitious monsoon, the failure of which means the ruin of their capital and labour for a full season. There is no scheme of irrigation capable of assuring this dire necessity of the people. What is still worse, many rivers of these tracts which, fifty years ago, were running streamlets have, or are becoming dried up. As a case in point I would mention, amongst others, the Baya, which was a running stream only half a century ago, but which is now practically dried up. The extent of the economic loss involved can easily be imagined. The course of the river still stands and if the water could be brought back, it would be productive of great wealth as the result of irrigation. The question of the revival of this river was taken up once but to our everlasting regret was shelved. This neglect is sure to prove disastrous in the long run.

QUESTION 10.—FERTILISERS.—I would certainly advocate the use of artificial fertilisers if prices suited the slender resources of our agriculturist classes and the fertilisers were easily available.

(*c*) Their use on demonstration farms and the advertising of them among the tenants.

(*d*) I would mention my own district where, since the advent of the cultivation by improved methods of sugarcane, a considerable increase in the use of manure has taken place.

(*f*) Though the waste is great in using cowdung as a fuel when it proves to be so good a manure, it seems hopeless to attempt to stop this practice till a fuel substitute can be found. The price of wood fuel is going up every day. It is not that the tenants do not know the value of cowdung as a manure, but the scarcity of fuel and their poverty stricken condition force them to use it as fuel.

QUESTION 14.—IMPLEMENTS.—(*a*) and (*b*) The use of improved implements raises an important issue. There are two important factors which affect their general adoption by the ryots. The first is a technical one with which I, as a layman, may not be competent to deal. But as I have received obejctions under this head from the ryots, when suggesting to them the desirability of the use of improved implements, I would draw attention to it here. Their view is that improved implements which occasion intensive cultivation deplete the soil, and what they can add to their income by their use is counter-balanced by the rest which the land requires to preserve its fertility. No doubt the land can be recuperated by the use of manures but, as we have seen above, the cultivators find it beyond their means to use manures extensively. The second deciding factor to a general adoption of improved implements is that they should be repairable by the village smiths.

The cultivators always feel it a hardship if repairs to their implements cannot be done within the limits of their own village.

QUESTION 16.—ANIMAL HUSBANDRY.—(*b*) I would submit here a general reply.

These questions relating to animal husbandry raise a very important issue. The depletion of livestock is one of the main causes of the agricultural backwardness of the country. The pressure on land has almost wiped out the commons of the villages. The scarcity of dry fodders also tells on the upkeep of cattle. Add to this that from our district there is a regular export of large herds of cattle every year to Bengal and other places where they fetch good prices. All these things have resulted in a dearth of good draught animals which demands very serious attention. If agriculture is to remain the primary occupation of the people, a full and efficient supply of cattle is very necessary.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*b*) The subsidiary industry which is now catching on amongst the people in these parts is the old *charka*. Though this is largely worked by the women, men are also using it in their spare time. If this vogue remains it seems as if it would provide useful employment for their off-time.

(*c*) I would not treat fruit-growing as a subsidiary industry; it rather forms an important agricultural pursuit. The export facilities have secured very good markets for the produce of the gardens. The returns from orchards, in my estimation, are much higher than from the cultivation of an equal area of land under field crops. My own district does a large volume of business in mangoes and *lichis*, the latter being a fruit for which the district is renowned throughout the length and breadth of the country. But fruit growing has not so far received its due share of attention from the agricultural departments.

(*h*) With the general awakening in the country and the advance of education, I find the attention of the people in rural areas drawn towards the improvement of the sanitation of their dwellings. In two or three cases I have to my gratification seen joint action by the whole population of a village to improve its health conditions. All that is required to advance them on these lines is to organise these efforts under expert supervision. No doubt this would prove a useful employment of their spare time, and I am sure the people would gladly lend their services in this direction.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) (i) In my experience I always find that labourers are attracted to the areas where good wages are available. During the rice harvesting season every year there is a regular exodus of coolies from our parts towards Bengal.

(ii) Similarly people go far afield to get cultivable land. Only two decades ago large parts of the Purnea district remained uncultivated. Its climate was considered to be the worst in Bihar; but as arable land was available, people flocked to these parts, large colonies of prosperous cultivators are now found on all sides, and it is difficult to acquire arable land.

(*b*) Shortage of agricultural labour in an acute form is proving the limiting factor of the agricultural industry and is prevailing in all parts. Its causes are many; the drawing away of the rural population to mill areas and other town centres where high wages prevail, the poor return from the soil and, to a certain extent, the disinclination to do agricultural work which entails hard manual labour.

QUESTION 23.—GENERAL EDUCATION.—I am of opinion that among other subjects taught in middle and elementary schools, instruction in agricultural matters should constitute a special feature. This instruction should be imparted by school manuals giving descriptions, say, of different soils, the seasons and methods of growing staple crops, etc. This theoretical instruction, combined with the demonstration farms which I have suggested should be attached to these schools, will prove highly beneficial.

Oral Evidence.

65,268. *The Chairman*: Babu Ganga Vishnu, you are a planter at Muzaffarpore?—Yes.

65,269. When you come into contact with the Agricultural Service, is it the provincial department or the staff at Pusa?—I come in touch with the Pusa Service. For what I know of the provincial department it seems to be a paper fiction, I do not know anything about it. A Commissioner of Land Records might still be, as in old times, in charge of this department. They had some arrangement like that before in which the Commissioner of Land Records was the head of the Agricultural Department, and it might be prevailing still in the Bihar and Orissa Government.

65,270. Would you tell the Commission how much land you cultivate?—2,300 *bighas* of land; it comes to nearly 2,000 acres.

65,271. What are your principal crops?—Indigo, wheat and other country crops.

65,272. Sugar cane?—I have taken to it for the last two years, since I came in touch with Pusa.

65,273. Have the results been satisfactory?—Yes, but then there is another difficulty. Though I am raising very good crops I am not getting good prices. The cane is supplied to the mills and last year they paid 5½ annas per *maund*, which makes it not a paying proposition.

65,274. You hope for better things this year, do you not?—Yes.

65,275. Is the extent to which Pusa cane is better than the indigenous cane very striking?—Certainly. I have already mentioned in my note that, since the new varieties were introduced, the cultivation of this crop has been revolutionised.

65,276. Have you any suggestions, other than those in your note, as to the means by which the Agricultural Service might get into touch with the cultivators?—I have already suggested the method of practical demonstration. That is the one thing necessary if you want the cultivators to take to these improvements. Without that any amount of pamphlets or any amount of lectures will be of no use. You should bring these demonstrations to their very doors.

65,277. What sort of demonstration do you think is most effective?—Take the case of sugarcane cultivation. It was done at Pusa and that helped me in going in for that crop. Otherwise I would not have done it.

65,278. Would you like to see the Service, which has helped you so materially, extended?—Yes.

65,279. You think it would be in the cultivators' interest?—I have already indicated in my note that there should be an Agricultural Department attached to every Provincial Government which in the

descending order must have at least one representative for each *thana;* that should be the minimum. Then all these different provincial branches should not work in watertight compartments of their own. In order to carry on their work efficiently there must be an Imperial Service to co-ordinate all the work.

65,280. Have you great difficulty in providing sufficient fodder for your cattle?—Sufficient fodder is not available.

65,281. Have you any suggestions to make?—Pasture land should be increased; that seems to be the only practical suggestion; but the pressure on the land is now very great and hence there seems to be no prospect of increasing the pasture land.

65,282. You do not connect this suggestion of yours for the extension of irrigation with the provision of more fodder? You do not think that it would be possible to provide an irrigated fodder crop?—It might be possible in that way, but all the same the pressure on the land is increasing; that is the great difficulty. I do not think, therefore, that pasture lands would be available, or land for raising fodder in quantity.

65,283. I observe in your answer to Question 8, that you take the view that there are opportunities for further irrigation in your district?—There is absolutely no system of irrigation provided in my district.

65,284. You are thinking of lift irrigation from these rivers?—You can have it. We have got lift irrigation from wells in one of the subdivisions of Muzaffarpur district where one acre of land is sold for Rs. 1,400; that is a record price, and shows how helpful irrigation is.

65,285. You say "Many rivers of these tracts which, fifty years ago were running streamlets have, or are becoming, dried up" How do you account for that?—It is due to silting of the river. No care is taken of them; that is the only cause. It is really one of the greatest drawbacks. I do feel very strongly on the point. I am also the secretary of the Landholders' Association of the Tirhut Division and in that capacity I brought this matter to the notice of the Government; but nothing was done and all these channels are being dried up.

65,286. Are you satisfied that the lessening of the water in this river is due to silting up?—Yes. At the same time, also, rivers which are now still running are liable to sudden floods and thus they are damaged.

65,287. You do not think that this change in the rivers is more likely to be due to a change in the distribution of the rainfall?—I do not think so.

65,288. You cannot deprive a river of its waters by leaving it to silt up; if the waters are there they must come down?—The water may take another course if the original channel is closed; as far as the Baya river is concerned, it is now filled up and cultivation is going on just at its source. There was a regular scheme to improve this river, but this was shelved.

65,289. How about wells? Have you any experience of irrigation by wells?—Irrigation by wells is carried on in one of the sub-divisions of my district where they can dig wells which stand without the help of brick walls to the sides; they have got that kind of soil which does not fall in and close the well. They have very good crops, with the help of this method of irrigation.

65,290. But you are not thinking here of perennial canals, irrigation by canals, are you?—No.

65,291. What form of fertiliser do you find most effective?—Under the instructions of the Sugar Bureau I have been using oil-cake for

sugarcane cultivation; I find it more efficacious than all the chemical fertilisers.

65,292. Can you obtain cowdung in your districts?—No, not much is available there; a great deal is used for fuel.

65,293. Have you ever attempted to purchase it from local villages?—I do not think it is available in great quantities.

65,294. Is it your view that, if better working bullocks could be provided, better farm implements could be used?—Yes, and there is also another difficulty. A large number of cattle are exported every year from these parts, year in and year out. You find wagon after wagon filled with these cattle; they are sent away to Bengal and other places.

65,295. Do you notice any demand amongst the cultivators for advice from the Agricultural Department?—Take the case of Pusa wheat: When it was first introduced we did not know much about it, but as soon as we came to know that here was a very good variety and a very heavy yielder we took to it, and now many people are growing that wheat. So I base my hopes on practical demonstration. If you go to the cultivators and demonstrate to them that such and such is a very efficacious method, they will adopt it.

65,296 Do you find that your own practice influences your neighbours?—Yes; I will again go back to sugarcane: For the last two years I have gone in for that crop and this year I sold 300 to 400 *maunds* of seed to agriculturists round about. They have taken to that variety and now it is spreading in that way.

65,297. How did you come in touch with Pusa about cane cultivation?—I saw a planter friend of mine growing good cane; I just asked him where he got it from; he told me that he got it from Pusa, so I came to the fountain head.

65,298. Now that you have discovered Pusa, do you sometimes come and have a look at what they are doing here?—Yes.

65,299. You constantly come here?—Yes.

65,300. Do you ever give the smaller cultivator a lift in your car to show him what is being done at Pusa?—I am afraid I have not done it so far. I am rendering a service to them in my own factory by showing them the things I am doing there, derived from what I have seen at Pusa.

65,301. *Sir James MacKenna*: Have you ever bought any cattle at the Pusa sales?—Yes, I bought two cows some years ago.

65,302. Did they do well?—Yes: I bought a calf which is now giving fourteen *seers* of milk a day.

65,303. That is very much better than the ordinary cow, is it not?—Yes. There is also a local breed of Patna cattle which gives a very good yield of milk.

65,304. *Professor Gangulee*: Is this area of 2,000 acres farmed by tenants or by you?—By myself, and I also give out land to tenants.

65,305. Under what conditions do you give it out to tenants?—I fix the rent at Rs. 10 or Rs. 15 according to the quality of the land.

65,306. Never on a crop basis?—No, not on a crop basis.

65,307. You state in your written evidence that many students to-day are very anxious to return to the land?—Yes.

65,308. Do you find that is so?—Certainly.

65,309. Among the Bihar students?—Yes, the economic position now is getting so bad that every one wants to have some land at least.

65,310. Are they able to get the land?—No, it is very difficult; the price of land is going up every day.

65,311. So that they are anxious to go back to the land but they cannot get the land?—Only this morning I received a letter from the secretary of an association at Pabna (I had been in communication with for the last three or four months) saying that lands could be provided there and that I should now take definite steps to send a party ahead to settle terms. I think some 400 or 500 men of Bihar are going to Pabna to take land.

65,312. If you had land would you have entertained such applications from students?—I would not; I would not part with my land.

65,313. Are you connected with the co-operative movement?—No.

65,314. On page 38 you say that indebtedness is not very general?—Yes.

65,315. Is that your observation?—Yes. The reason of the co-operative societies making no great advance is that the executive of these societies do not invite the co-operation of the landholders in their work or join hands with the landholders. They also interfere with the peaceful relations between landlord and tenant. The co-operative society is like a mother-in-law coming in and disturbing the peaceful relations of a peaceful home.

65,316. You are not familiar with the work of the co-operative movement?—I am familiar with it but I do not take to it.

65,317. Why?—Because, as I say, they always come in between landlord and tenant; that is why they are becoming unpopular. Take the case of a friend of mine; a society made a complaint against him that he was not issuing rent receipts, which is a criminal offence. Now the poor landlord has to fight out this charge against him, which to my knowledge is not a true one.

65,318. So that in your view the co-operative movement is not popular with the landlords?—No; it really tends to prevent co-operation between landlord and tenant and thus keeps their relations strained.

65,319. Do you yourself lend money?—Yes, I do.

65,320. To whom?—To those who require it; I am doing banking business in a small way.

65,321. Can you tell me whether the tenants of your Province know of the existence of the Usurious Loans Act?—I do not think that knowledge of the Act is very general.

65,322. They do not know of the existence of such an Act?—I say that knowledge of the Act is not very general.

65,323. You yourself know of the existence of such an Act?—Certainly.

65,324. Have you made it known to your tenants?—I have got no moneylending business with them.

65,325. Do you not think it a duty of yours to make the Usurious Loan Act known to your tenants?—I expect the co-operative societies are doing that.

65,326. *Mr. Kamat*: For how many years have you been engaged in agriculture?—Since I was born.

65,327. From all these years of observation can you tell me whether agriculture as a business is more prosperous now than it was, say, ten or twenty years ago?—In one way it can be said to be more prosperous

because now the price of land, as also of the produce, has gone up. In that way, only; can you say it is very prosperous.

65,328. Have you heard it said, or have you read in the Press, that in India there are people who cannot get even two meals a day?—Yes, I have read that, and I know that there are people in that position.

65,329. I want to know whether you have seen it?—Yes.

65,330. There are people whom you have seen who cannot get two square meals a day?—Yes.

65,331. And still you say that agriculture is more prosperous?—Because, you see, holdings are now being split up leaving very small holdings to support a family; land is passing out of the hands of the cultivators and they are becoming day labourers; there are many causes which bring about that sad state of affairs.

65,332. You say that, where arable land becomes available, people flock to those parts and you now find large colonies of prosperous cultivators springing up on all sides?—Yes.

65,333. How do you reconcile that statement with the fact that you see people without two meals a day?—Those who emigrate are in a prosperous condition, but not those who remain behind and become day labourers possessing a small area of land, which gives them bare subsistence.

65,334. With regard to subsidiary industries you say the *charka* is now catching on with the people?—Yes, I do find that.

65,335. They use the *charka* as a sparetime occupation?—Yes.

65,336. You find more *charkas* in your district now than you did, say, in 1921-22?—Yes, I do.

65,337. Are these *charkas* used by the cultivators or by the middle class people?—Chiefly by the cultivators, whose womenfolk use it largely; the middle class are now also taking to it; it may be that it is merely the vogue just now, but they are doing it and I think it gives them a good return.

65,338. Can you tell me what return they get?—I think in off-times they can make one or one-and-a-half annas worth of thread.

65,339. Do you mean per day or per hour?—Per day.

65,340. Are they willing to work at the *charka* eight hours a day to earn one anna?—I do not say they work eight hours; they can earn that if they work steadily for, say, three or four hours.

65,341. That is what you meant when you said per day?—I do not mean to say they are working the whole day through.

65,342. Could you tell me, roughly, how many *charkas* you have seen round about your own locality?—I have myself seen thousands of *charkas* working.

65,343. In the neighbourhood of your estate?—Yes, in many villages of my own estate, so that I say *charkas* are becoming popular; every village has ten or fifteen working, and that comes to a large number in a hundred villages.

65,344. *Sir Thomas Middleton*: Speaking of students who have graduated you say they require fat berths?—Yes.

65,345. What do you mean by a fat berth?—I once advertised for graduates of that class and they wanted an initial salary of Rs. 200 and Rs. 250, so I did not employ them.

65,346. If you had a son who had graduated, what would you think was a reasonable berth for him?—I do not think he would want to be

an agriculturist; he would become a lawyer, which is the general ambition of the young men of the country.

65,347. But what remuneration would you think he ought to have?—Say Rs. 100 to start with.

65,348. You say cultivators do not like improved implements because these implements take too much out of the land?—I am there speaking as a layman; that is the complaint I have received; they say that if they do intensive cultivation the land requires a rest, and that whatever increase is obtained by intensive cultivation is lost in allowing the land to remain fallow.

65,349. Have you ever seen such a thing happen?—I have used tractors; I bought two, and I found that after a crop or two by cultivation with those tractors the land does require more rest than after using the country ploughs. No doubt they are more productive.

65,350. Is not that because the tractors may be too heavy for your land?—I am a layman, I cannot tell you.

65,351. When you sell cattle to Bengal what is paid per pair?—They pay higher prices than are obtainable here.

65,352. Can you give me some idea of the general price now?—I think, for a good pair of draught plough bullocks, you will now get not less than Rs. 150 or Rs. 200.

65,253. So that there is a good market for these plough cattle?—There is a good market; everywhere there are weekly markets and a large number of cattle change hands; sales are very brisk.

65,354. You have told us there are very few pastures in the district?—Yes.

65,355. So that all these cattle are reared in the villages?—They are reared in the villages only to be sold.

65,356. People find it a profitable trade?—Yes.

65,357. How are the cows fed in the villages?—There is still some pasture, and dry fodder is also used.

65,358. Is it usual to give the cows grain?—I do not think it would pay to do that as the price of grain is very high.

65,359. Do they give oil-cakes to the cows?—Oil-cakes also are very dear.

65,360. You yourself must keep a number of cows on your farms?—But we have got that dry fodder called *bhusa*.

65,361. And you feed your cows with nothing but *bhusa*?—*Bhusa*, and also some quantity of grain.

65,362. I want to know the quantity of grain?—Say about a *seer* and a half.

65,363. After they have calved?—Yes.

65,364. Is there no practice of growing fodder crops for cattle?—There is the country variety of sugarcane, and also what we call *janera*, the English equivalent of which I do not know. That is a fodder crop.

65,365. *Professor Gangulee*: Do you know what is being done in Pusa about fodder?—I cannot tell you. I hear that they have also got green fodder, but I have not studied that crop.

65,366. Do you know if any experiment is being made in Pusa for the preservation of fodder?—Yes, I know that they are preserving fodder there.

65,367. How are they doing it?—I cannot tell you that.

65,368. You have told us that the land is passing out of the hands of the cultivators. Why?—Because they are selling it.

65,369. To whom?—If the middle class people who have made some money want to purchase land they pay a good price and take the land.

65,370. Land is not sold to the moneylenders?—Yes, moneylenders have also a good share of the land, but at the same time there are others who buy land besides moneylenders.

(*The witness withdrew.*)

Monday, November 21st, 1927.

PATNA.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.	Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Sir THOMAS MIDDLETON, K.B.E., C.B.	Professor N. GANGULEE.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.	Dr. L. K. HYDER.
Mr. H. CALVERT, C.I.E., I.C.S.	Mr. B. S. KAMAT.

Mr. E. DANBY, Babu A. P. VARMA } (*Co-opted Members*).

Mr. J. A. MADAN, I.C.S., Mr. F. W. H. SMITH } (*Joint Secretaries*).

Mr. A. C. DOBBS, Director of Agriculture, Bihar and Orissa.

Replies to the Questionnaire.

GENERAL STATEMENT.

I have taken advantage of the breadth of the Questionnaire to suggest a comprehensive policy of rural development; because, while the continued improvement of agricultural practice presents little difficulty, if approached scientifically, and the adoption of improved practices is merely a question of practical experience of their economic value, the effect of such adoption—which will not by itself raise the value of the cultivator's labour in this Province above that of an inferior mechanic—will only be to increase the mass of the population, and incidentally of rural poverty, unless the root causes of such poverty are simultaneously scientifically analysed and attacked.

As I see it, rural poverty in the mass is cumulative, through its effect on the composition, character, and habits of the rural population—reinforced by a monetary and legal system which, in effect, mortgages rural assets to urban absentees on terms which, under the system of cash rents, have no relation at all to production. Rural assets imply legal debts; and debt means disorganisation as surely as organisation requires capital.

The laws of property cannot be lightly altered, and I therefore suggest that the only way in which Government can really promote the welfare and prosperity of the rural population is by accumulating and investing capital in an active campaign of rural organisation, which will redress the balance and eventually develop a rural culture such as may draw wealth and intelligence back to the now deserted countryside.

My specific suggestions may seem radical on the surface; but the adoption of a new principle or the reversal of an old one does not necessarily imply any subversive change; it merely implies that every problem, as it presents itself, is looked at in a new light. For instance, I have suggested that National borrowing should cease: debts are in fact already being paid off. I have suggested that revenue should be raised by a special tax on income secured by law on contracts. I do not suggest that it should be heavy. I have suggested that there should be an officer of the Provincial Civil Service in every revenue *thana*: I would start in one *thana* when occasion arises.

Organisation.

QUESTION 1.—RESEARCH.—(*a*) (i) Yes. In my experience the great mass of precise investigations undertaken for the benefit of the agriculturist in Bihar and Orissa must be conducted on farms in the localities affected, and the organisation required is therefore a strong territorial staff with a minimum of centralisation. On the other hand, connected investigations of a chemical or biological nature require an equally strong centralised staff, of specialists, which cannot be effectively controlled by one man with the qualifications ordinarily possessed by a Director of Agriculture. Such highly specialised investigations could be carried out without difficulty in the laboratories of a University properly equipped for the needs of an agricultural country, and I suggest that the Patna University should be equipped for assisting the territorial officers of the Agricultural Department in approved investigations.

To begin with, the Chemical and Botanical sections of the Agricultural Department could be transferred from Sabour to Patna, as parts of larger units organised for research and consultation, as well as for the work conventionally classified as educational.

This would restrict the work of the Agricultural Department, proper, to the field, the steading, and the workshop—under the Deputy Directors of Agriculture and the Agricultural Engineer, under whom its organisation is already developing on a fairly satisfactory basis.

The above suggestions are based on a clear distinction between researches that can be classed as primarily agricultural and those that must for practical purposes be classified primarily on some other technical basis, such as the study of chemistry or plant physiology, which need a special discipline and special apparatus.

My view is that to be of maximum utility to agriculture, a chemist should not limit himself within the field of agricultural chemistry, however deeply interested he may be in agricultural problems; and that to confine his outlook to such problems is merely to limit the resources on which he can draw for their solution, as well as his own scope and ambitions.

Co-operation in research between an agriculturist and a chemist should, in my opinion, be organised on the basis of free and unfettered discussion, inspired by mutual interest and the greatest confidence of all parties to the discussion in the accuracy and judgment of the other in their own spheres of observation and experience. I do not therefore think that Government can usefully do more in the way of organisation of co-operative research than specify the duties of its specialists and do its best to ensure that (for instance) its scientific agriculturists shall be good agriculturists, and its agricultural chemists good chemists, by providing the best possible *milieu* for the selection and development of each.

It is for this reason that I advocate the classification of specialists for administrative purposes according to the technique which they practise rather than the interests they profess; and I would ensure that

they do the work required of them by making grants for the specific purpose, on the basis of proposals agreed upon by the departments concerned, and of the actual staff and expenditure which each department finds necessary in order to comply with the requirements of others.

Financing.

The Agricultural Department's investigations are being financed for the most part according to an agreed programme of farms all over the province. New proposals are considered by a Standing Committee of the Legislative Council.

Administration.

There remains the administration of research which is governed by the hostile criticism, appropriate to control by the Finance Department, of all proposals before submission to the Legislative Council for the voting of funds.

Apart from the formal sanctioning of transfers of men and money, Government take no cognisance of the administration of the work of agricultural investigation, and is not in fact in a position to do so unless the Secretary or Member in charge has special qualifications for the purpose. But this means that when the service is provincialised the Director of Agriculture will be selected, and the department in effect controlled by Government, without reference to its fundamental work or to the principles by which that work should be guided.

Successful experimental investigation is essentially dependent on precision of observation—a habit which, unless it has been acquired by the staff before their engagement (and no scale of pay within the sphere of practical politics could secure this), must be constantly inculcated in the staff in charge of the investigations, by correspondence and inspection. The work of several of the small farms in this Province has shown how effective in introducing agricultural improvements such local investigations can be—provided only that they are properly inspected and controlled. But such successes are for the most part of comparatively recent origin: little attention was given to the necessity for precise local observations and experiments in the early days of the department, and there is no means of ensuring that greater attention will continue to be paid to it in future, under a system of recruitment within the Province, unless Government insist on the point and unless a system, however elastic, be devised for giving effect to such insistence. The development of the theory of statistics has contributed to make such scientific control a comparatively straightforward matter, and there is no longer any excuse for failure to establish it—in the case at least of the scientific departments—by the employment of qualified men for the purpose. If, in fact, a Government takes economy seriously, it should take into its inner counsels officers selected and trained for such control.

Such an officer should be a Scientific Commissioner rather than a Secretary to Government, but he might combine the functions of both, in respect of one or two allied departments such as the Agricultural, Industrial and possibly the Settlement, departments. He should have a Statistical Assistant and could relieve the Director of Agriculture of his statistical work and of most of his correspondence with Government.

His most important function would be to satisfy himself that the directors of the departments under him were capable of directing scientific work, and he should normally be chosen from among them.

Failing the emergence of any one in the Agricultural Service apparently competent (even after special training, for which study leave should be freely allowed to promising men) to succeed a Director of Agriculture who was within five years of retiring age or within sight of promotion, an outsider should be recruited on special contract, or

seconded from some other department, for a year or two on probation as a Deputy Director of Agriculture. If he showed sufficient capacity for the scientific and administrative control of the work of his range he would be designated to succeed the Director in due course.

Scientific control of the Agricultural Department could, I think, be sufficiently secured in this way; but in order to ensure the adequate representation of the point of view of the practical agriculturist, I would stipulate that, as a rule, either the Director of Agriculture or Scientific Commissioner in charge of the department should be a member of the Agricultural Service in India.

Failing such administrative changes as will relieve the Director of Agriculture of the undue amount of work now involved in the representation of departmental requirements to Government, and will ensure that he has the qualifications and time to direct the experimental work on scientific lines, he requires supplementary expert assistance. The Deputy Directors, Economic Botanist, Agricultural Chemist, and Agricultural Engineer organise investigations, each in his own sphere. I have done my best to review and co-ordinate their programmes and results by inspection and correspondence, but as experience has revealed increasing numbers of openings for promising investigations, the time required for this work has increased altogether beyond what I can spare without detriment to the administration of the department under the present system. I have made several attempts to obtain special assistance in dealing with one or other of the aspects of the department's work—agronomy, animal husbandry, administration, propaganda—but the right man has in no case been forthcoming from outside the department. An additional appointment of Special Assistant is required in present circumstances in order to enable one of the Deputy Directors to be selected from time to time for the special study of any such aspect of the department's work—after being given leave for the purpose of study out of India if necessary—and to help the Director in overhauling the machinery for dealing with it.

Such special assistants would form, together with the Agricultural Engineer, an intelligence branch which would co-ordinate the department's work within the Province and enable it to keep in touch with work outside.

The Deputy Directors also require more skilled assistance than has hitherto been provided. Agricultural problems in this Province are for the most part of local importance—which means that they are extraordinarily diverse and numerous. There is not, so far as my experience goes, a single variety of crop or manure the value of which is not strictly limited by geographical conditions within the Province. The number of farms contemplated, on which these problems will be studied, is 64—one in each sub-division. The number of gazetted officers in charge of these farms as well as of the dissemination of the results of experiments and the training of the subordinate staff is 10. It is impossible at present to undertake half the work that would clearly lead to early improvements of local practice—in the direction, for instance, of testing manures and selected strains of crops—with the present staff. Experience has shown that in view of the low standard of educated intelligence among the subordinates of the department, who cannot be selected on any basis of intellectual achievement, a very much larger number of gazetted officers will be required if the experimental work on the farms is to be expanded, or even maintained, in the face of increasing demands for the dissemination of the results already obtained.

I have recently proposed that the number of Deputy Directors should ultimately be increased from four to seven and that each should be given two gazetted assistants, instead of six between the four—more than doubling the total number of gazetted officers contemplated; and, if the local scientific investigations that agricultural research in this Province connotes are to be maintained, further expansion of the subordinate staff must be preceded by the appointment of an additional gazetted assistant for each of the Deputy Director's ranges.

Babu Manmatha Nath Ghosh, officiating Agricultural Chemist at Sabour, has at my invitation given a reply to this question which I reproduce:—

"The present organisation is defective. Researches in agricultural chemistry leading to the welfare of the agriculturist are now being conducted by the Agricultural Chemist who, however, has not been supplied with the requisite staff. The chemist should have a sufficient staff and should belong to the agricultural services only and not to any wider chemical organisation having different aims, and should be subject to the administrative control of the Director of Agriculture who should have sufficient technical knowledge to give advice and to criticise healthily any particular plan of work submitted to him by the chemist. If the Director of Agriculture be not a chemist the latter work may well be entrusted to a committee consisting of persons, departmental or outsiders, having the necessary technical knowledge and presided over by the Director of Agriculture who will be able to secure, in respect of field experiments, the co-operation and assistance of the Deputy Directors. An ideal organisation will be to have a fully-equipped agricultural college attached to the University and make this the centre of all activities. The technical advice and criticism sought after may then be found among the co-workers in the University and may be usefully sought by the Director of Agriculture in maintaining control over the chemical section. The University at present has no classes in agricultural chemistry and as such has no interest in matters agricultural, and is therefore unfit to exercise healthy control. Visits to other laboratories and exchange of ideas with other provincial workers in the same line ought to be encouraged.

It is desirable that the financial assistance given to research should not be liable to constant changes; and a definite sum should be allotted, for, say, five years, to be revised again after the lapse of this period."

As regards Babu Manmatha Nath Ghosh's suggestion that the ideal organisation would be an agricultural college attached to the University, my view is that on the one hand an agricultural college should be a technical institution elaborating and teaching agricultural industries such as *gur* manufacture, dairying, fruit-growing and marketing, fibre extraction, etc., and should not teach, or conduct researches in, chemistry as such; and on the other hand that Patna University, having regard to the purely agricultural character of Bihar, should relate its whole outlook, the nature of its researches, and the material it uses for educational purposes, to agricultural interests. This is, I understand, a principle commonly followed by modern Universities, such as those in the North of England, with great and growing success.

(*b*) The fact that the field for local investigations is not half covered and that only a few of the most obvious possibilities of improvement (for instance of crops by selection and manuring) can now be exploited, has deterred me from insisting that the Deputy Directors should pay the attention to the improvement of fruit, vegetables, and other garden produce that I consider their importance, present and prospective,

merits. Progress in this direction is therefore dependent on individual initiative in the staff, and at present practically none is being made.

Babu Manmatha Nath Ghosh has supplied the following answer to this question:—

"The whole work of the Chemical Section is being hampered by not being allowed to maintain an adequate staff. There are not enough workers to carry on any work but routine analysis of various substances required for the departmental farms.

A soil survey of South Bihar was started. In South Bhagalpur wide areas were located with marked poverty in phosphates. In such lands, the application of superphosphates with green manuring proved a remarkable success. The soil survey work was extended to South Monghyr and East Gaya. Here the results were more interesting. (*Vide* Appendix iii of Department's Annual Report for the year ending 31st March 1926.) Part of the eastern portion of the Gaya district showed a deficiency of this constituent, but a tract was found where the *rabi* lands contained a much larger percentage of phosphates, a good deal of which was, however, insoluble. It was thought desirable to make a thorough survey of this tract and recommend means by which insoluble phosphates in the *rabi* lands can be rendered more available. This work had to be stopped because of the decision of Government not to provide specially for its continuation."

As to the above reply I have to say that I am not prepared to advocate any considerable increase of the expenditure on the Chemical Section, under an officer on the provincial scale of pay, so long as the Director of Agriculture is not himself a chemist; and I think that, having regard to the preponderating importance in this Province of investigations the control of which requires a sound agricultural judgment and no technical skill in chemistry, it would be a mistake to select a Director of Agriculture primarily for his qualifications as a chemist.

(*c*) (i) In view of the importance of pulses in Indian agriculture and of vegetable protein in Indian dietary, the possibility of introducing methods of making Indian vegetable proteins more palatable and digestible—as in the manufacture of soybean products in Japan and China—might be worth serious investigation.

(ii) The export of oil from Indian rural centres to markets outside India is, I understand, now economically impossible because of transport difficulties. Research on this point might add considerably to the value of the oilseed crop, which is of very great importance in Bihar, and to the quantity of cake available for food and manure.

(iii) I suggested in a note in the *Agricultural Journal of India* for March 1926, that the phenomenon of endothermic solution, implying as it does a simple concentration of energy, opens a way round the Second Law of Thermodynamics; and indicated a possible way of utilising waste heat by this means. The Second Law is, of course, in a very strong position; but no one has, so far as I am aware, detected any fallacy in the theorem propounded. The difficulties appear to be purely practical and not theoretical; and, in view of the special importance of all sources of power in alluvial plains, and of cold storage in India generally, I suggest that the Government of India should obtain the opinion of a competent chemical engineer as to whether there is not, in fact, scope for research in this direction.

QUESTION 2.—AGRICULTURAL EDUCATION.—(viii) Please see my reply to Question 23 (*a*).

(x) The following reply to Question 2 (x) has been supplied at my suggestion by Babu Bhutnath Sarkar, Assistant Director of Agriculture, Chota Nagpur—himself a young man of the middle class, who passed out of Sabour College in 1915.

As regards his last paragraph my own view is that it is impossible for any one who has not himself been brought up to manual labour to make agriculture, as such, pay for supervision—in competition with labouring cultivators instructed by a scientific agricultural department and organised for co-operation under Government auspices.

"I presume the term "middle class youths" to mean youths of the middle class who have had a certain amount of education, because boys who have not been fortunate enough to get a literary or other training generally find themselves compelled to take to agriculture and to try to make a living out of it. In considering the question of attracting young men to the pursuit of agriculture, it is necessary to take note of the inducements to take up other employment in preference to agriculture. Such inducements are briefly as follows:—

(1) Under the existing conditions in this country farming is very poorly remunerative even to those who not only work for themselves but make their wives and children work also. The ordinary middle class man who will not work himself nor allow his wife and children to work must depend on hired labour and therefore stands very little chance of success in farming. Further, as such a man's holding is generally fragmented there is not much scope for the employment of what capital and intelligence he may possess.

(2) Due to climatic and other causes a tradition has grown up in this country which strongly deters the middle classes from working in the sun and rain. Those who can afford to avoid outdoor work earn the envy of their fellows. Also young men who have had some education get themselves laughed at by their relatives and their fellow villagers if they elect to stay at home and take up farming.

(3) As life is generally easier in the services and professions, the middle class young men find them conformable to their ideals and prefer them to outdoor work.

(4) He who chooses agriculture has to live in a village and the young man finds this, from the point of view of health and other amenities of life, very irksome.

It is therefore not surprising that the best boys of a village leave farming to those who are good for nothing else. This departure of the best brains to towns and large centres is one of the causes of the present deplorable condition of the villages. It is more agreeable and more profitable to a young man to farm out his share in the family property to tenants and put what money he gets from them into a bank and then go off to look for a job in a town. Should he be induced to stay in the village to take up farming he will almost certainly fail, through ignorance of the work and through being unaccustomed to village life. I do not consider that the technical education acquired in an agricultural school or college will help to make him a farmer. To become a successful farmer he must be conversant, from actual experience, with the methods of local farming. And besides accustoming himself to hard work he will need a considerable amount of tact, foresight and, above all, some power of organisation. At present, all the agricultural colleges can teach is a general knowledge of the theory and practice of agriculture—mostly derived from Europe and America. However valuable such knowledge may be to a research student, it alone will not induce men to take up farming. For the same reason, training in the existing experimental farms will not help matters: for these farms are meant for research, and are not worked on commercial lines.

Mr. A. C. Dobbs.

I do not think it is possible to make agriculture attractive to boys unless and until their parents or guardians learn that agriculture can pay a reasonable dividend on invested capital, which at present it does not do on any ordinary holding. In my opinion Government should organise and run a few farms solely to develop a system of farming which will pay a handsome dividend, at least as much as, if not greater than, that paid on money deposited in a bank. If this be done, it will not be difficult to attract boys with a sound primary and perhaps secondary education to take up a long apprenticeship training on one of these farms. From such material, trained along such lines, successful farmers are likely to evolve. To abolish the tradition of shame attached to manual work the primary and secondary schools can do much by giving boys school gardens to cultivate. In short, what is wanted is a training, of the mind as well as of the body, which can immediately be applied to earning a living out of any ordinary holding, in preference to the existing system of memory training."

(xii) If it were possible to draw on any fund of information—of interest to cultivators, and sufficiently wide to increase considerably the popularity of newspapers to which such information could be contributed—I think this would be the most effective form that adult education in rural tracts could take.

A large increase in the number of well educated Indian officials would perhaps make this possible, and would itself have a very great effect. Please see my replies to Questions 25 and 4 (*c*) in this connection.

For the information of the Commission I append more detailed replies on the subject by two members of the department's staff:—

The following answer to Question 2 has been supplied, at my invitation, by Babu Manmatha Nath Ghosh who was Assistant Professor of Chemistry and Superintendent of the hostel when the Sabour College courses were open:—

"My experience is limited to the college education in agriculture and my remarks apply to this.

(i) There is no agricultural college in the Province, the one it had being abolished in 1923. If a college is now started there will be a dearth of efficient teachers unless some engaged in other work are brought back—to the detriment of the work they are already doing.

(ii) There is need for an agricultural college able to train recruits for the department and others who may choose to have such a training.

(iii) Preferably, if available.

(iv) The Agricultural College at Sabour just before it was closed had a two years' course. The first year class was always full, and a good many applicants had to be refused admission owing to want of accommodation. There was not a full complement in the second year class, as a good many of the students admitted in the first year were not of the required quality and had to be sent away during, or at the end of, the year. If the college were affiliated to the University and trained pupils for a degree, men of the requisite stamp would have been forthcoming.

(v) Service in the Agricultural Department and with private proprietors. At present Messrs. Shaw Wallace and Company of Calcutta have organised propaganda for ammonium sulphate and a good many who are not able to secure Government service have found occupation there. I know only of two persons who have started farms of their own and they are said to be prospering.

(vi) No.

(ix) This question has been answered under (v).

(xi) Only those who have got into the department receive training on the farms."

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) Demonstrations, on cultivators' land and departmental farms, have been very successful in improving the practice of cultivators in this Province.

(*b*) and (*c*) The following replies have been supplied by Babu Bhutnath Sarkar, Assistant Director of Agriculture, Chota Nagpur:—

(*b*) "To increase the effectiveness of field demonstrations it is absolutely necessary that the staff of the Agricultural Department should exercise strict control and that quantity should always be sacrificed to quality. One failure in the beginning of propaganda work may entail a general setback in the particular locality."

(*c*) "Though there are differences in the general level of intelligence, energy and outlook among the different types of cultivators throughout the Province, the general run are illiterate and live in a state of perpetual fear. They are afraid of natural and supernatural phenomena, they are afraid of their priests, of the police, the Government officials, the zamindar, the *mahajan* and almost anybody and anything. This fear naturally gives rise to suspicion, so that they smell mischief in almost everything that is not thoroughly known to them.

To induce people with such mentality to adopt expert advice, it is absolutely necessary that such advice be perfectly candid and based on facts which have been thoroughly tested under conditions similar to those of the cultivator. Secondly, the subordinate staff for propaganda work should be recruited from among the cultivating classes (not necessarily the cultivating castes) in whom the cultivators will naturally repose confidence. Thirdly, demonstration should begin among the zamindars, big cultivators, and non-official co-operative workers who have already won the confidence of the people. These will pass on the knowledge to the small cultivators who will then appreciate demonstrations on their own fields."

Experience has however shown that ordinary cultivators will commonly adopt expert advice without difficulty if it is simple and demonstrably economical and effective.

(*d*) The introduction of groundnut and of Co. 213 sugarcane, and of the manuring of potatoes and vegetables with sulphate of ammonia in South Bihar are striking instances of successful demonstrations. The whole of the 1926-27 crop of cane on three of the small farms of the department was sold to cultivators for planting on their own land. The reason for this success is, in my opinion, the luxuriant growth of the demonstration plots, backed up by the simplicity of the improvements and the very large profit obtained.

QUESTION 4.—ADMINISTRATION.—(*a*)* The employment, under the Government of India, of a staff of scientific and technical consultants thoroughly competent to advise local Governments on special problems connected with agriculture, and to train, and when necessary review the work of, the officers of the local agricultural departments would, I believe, lead to better co-ordination of the activities of Local Governments.

---

* See Appendix A, page 110.

These activities might continue to be usefully supplemented by the investigations of such experts—which have already supplied the Provinces with seedling canes from Coimbatore, Montgomery cattle and strong wheats from Pusa, and advice on dairy matters from Bangalore.

Pusa has never taken, or been given, the place that it might have occupied as an institution for training the best brains that the provincial educational systems could produce for the scientific investigation of practical agricultural problems; and the staff have not been recruited for this specific purpose. Some of the Provinces have no doubt aspired to do this work themselves; but, with provincial recruitment, the Local Governments will, I think, be forced to recognise that the standard of graduate and post-graduate teaching at provincial agricultural colleges cannot be maintained at a sufficiently high level to turn out men competent to maintain by scientific methods any considerable continuous advance in agricultural technique. In the absence, then, of some central organisation whereby a high standard of agricultural research is maintained, if only for training purposes, other Provinces will, in my opinion, be forced to adopt some such administrative changes for the better control of their agricultural departments as I have already suggested for my own Province.

In reply to this question Babu Manmatha Nath Ghosh says:—

"There is some co-ordination at present, the Government of India advising the Local Governments in matters in which the Local Governments maintain no experts, *e.g.*, in mycology and in entomology. In other matters, co-ordination may be promoted by occasional visits to different centres and by periodical conferences."

(*b*)* The staff suggested in my reply to Question 4 (*a*) should include, in addition to the present staff at Pusa, Coimbatore and Bangalore, an Agronomist thoroughly trained in the application of statistical methods to biological problems. Further numerical increase would be necessary for the investigation of special problems not within the competence of any one provincial department, such as the investigations connected with vegetable proteins already suggested.

The Economic Botanist at Pusa is already, I understand, investigating the flue-curing of Indian tobaccos; but, if he were fully occupied with botanical research and training, a special expert would be necessary for this or similar investigations.

The work of scientific experts under the Government of India should, in my opinion, be controlled by inspection and review by scientific officers of the calibre of Fellows of the Royal Society of whom, for instance, Sir Gilbert Walker might have been one. The Director of Statistics and other heads of scientific departments under the Government of India should be men of this calibre; and, if a man of similar intellectual qualifications were not in view in such a department within five years of the normal period of retirement of its existing head, special arrangements should be made to recruit a man on probation from outside The heads of such scientific departments together with the Indian Fellows of the Royal Society—of whom there are now, I believe, three—might form a board for the purpose of reviewing periodically the work of their prospective successors and selecting probationers from outside if necessary; and for purposes of consultation with one another, and through one another with and by the expert officers of one another's departments.

---

* See Appendix A, page 110.

Babu Manmatha Nath Ghosh replies to this question as follows:—

"No. The Local Governments have their own problems, and should be free to tackle them with the help of their own experts. No administration by any body not subject to the control of the local Government can be efficient in a Province. Advice from the Government of India experts are however desirable, and should be obtained, wherever possible, and co-ordination of work and co-operation of various provinces should be obtained by them where such appear to be necessary."

(*c*) (ii) I am not satisfied with the services afforded by the railways. Losses during transit are much too frequent and sufficient checks are not provided. I have seen a train load of passengers disembark and steal sugarcane from a neighbouring truck, and sufficient efforts are not made by the railway subordinates to check thieving of this kind.

Passenger trains lose time at stations, quite unnecessarily, because of the slackness of the staff. Platforms are not lighted because the oil for the lamps is stolen. The services would be improved by fostering and focussing public opinion, and by the systematic reporting of cases of dishonesty or neglect. This should be recognised as one of the chief duties of local administrative officers—whose numbers, I suggest, require to be greatly increased for this and similar purposes.

(iii) Roads in rural areas should be very much better maintained, particularly in the matter of grading to throw off the water and provision for the crossing of streams and depressions.

The minimum width of the tyres of wheels used on the roads might then be prescribed by law. For such purposes, also, local public opinion requires focussing on defects and abuses, which should be systematically reported to the authorities concerned.

(v) and (vi) All public services could, in my opinion, be very much improved by frequent inspection in rural areas by an independent general administrative officer, and systematic reporting of defects and abuses.

The idea of a public servant as a servant of the public, and not its master, hardly exist, so far as I have observed, in rural areas in this Province; and it requires to be developed by every means possible.

QUESTION 5.—FINANCE.—(*a*) Assuming that all contracts relating to land and buildings are registered with Government, all encumbrances in respect of cultivators' holdings will be ascertainable. Government should, in my opinion, freely advance money to those who have occupancy rights, up to the amount of a conservative valuation of their holdings or any part of their holdings for purposes of a first charge. Such advances should be used in the first instance for paying off encumbrances, and any balance towards improvements.

They might be paid for out of revenue raised as suggested in my reply to Question 6 (*c*); and, as revenue increases, might extend to advances for the purchase, by the occupier, of the landlords' interest, on mutual application.

The Irish Land Purchase Acts afforded a classical example of the safety and success of such a policy.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) The main causes of rural borrowing seem to be the vicissitudes of agriculture due to the

vagaries of nature, and the tendency of an increase of personal expenditure in the towns, where it is based on accumulation of money within a narrow field of enterprise, to stimulate a similar increase of expenditure in the rural areas from which these accumulations are drained.

The pledging of land to a moneylender in a neighbouring town, as contrasted with its sale to neighbouring cultivators, directs the stream of surplus wealth, available for the development of the community, from the rural resources which need development to the urban centres, where it is difficult to find outlets that are not extravagant.

In these conditions such expenditure as takes place on development is directed to increasing the wealth of the towns and sapping the independence of the countryside.

(*b*) I suggest that by cessation of public borrowing and the raising of funds, for development, from revenue derived directly and indirectly from such development, that is to say by investment in railways, canals, communications generally, and the promotion of other common objectives, Government can counteract the present tendency and release the countryside from the cumulative mortgage to the towns.

Per contra, any measures for facilitating rural borrowing by pledging national credit will tend to maintain the rate of interest on funds available for public works and restrict rural development.

(*c*) Any legislation which facilitates the transfer of land from one user to another but discourages long term contracts will in my opinion benefit rural areas.

I suggest that contracts relating to land or buildings should be subject to the following provisions:—

(i) No registration fee should be charged on sales.

(ii) Registration fees should be charged on all other contracts, and should include a charge for revenue purposes proportional to the total value of any payments the contract may provide for during the first year or part of a year to which it relates, or their equivalent.

(iii) All contracts providing for such payments should specify the conditions on which they are terminable; should terminate annually on those conditions, and should only be renewable with the consent of both parties and on the payment of the revenue charge suggested in (ii) above.

The provisions supplemented by the system suggested in my answer to Question 5 (*a*) or advances by Government to those who have occupancy rights would, I suggest, super-impose on the existing system of land ownership and tenancy a system of transfer so simple, fluid, and advantageous to all concerned that it would slowly dissolve the growing cancer of vested interests in a stream of capital competing for the purchase of and development of rural resources, and producing an increasing revenue.

Any tendency of increased facilities for the sale of occupancy rights to increase the number of landless labourers, whose position in the congested districts of North Bihar is already deplorable, could probably be more than offset by opening up communications with the sparsely populated tracts along the Nepal border. Moreover the finding of outlets for surplus rural energy is in any case the most important research and administrative problem in rural economy in the East, and presumably only requires concentration of attention and effort for its solution. Please see my replies to Questions 1 (*c*), 17 and 25 (*a*) in this connection.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) If it is possible to facilitate the transfer of portions of holdings between occupiers by advances in perpetuity to the purchasing party as a first charge on the whole or any portion of his new holding, or in any other way whatever, I think this should be done.

(*b*) The following answer has been supplied by Babu Bhutnath Sarkar:—

"The two chief obstacles that stand in the way of even partial consolidation of holdings are:—

(1) The Hindu and Mahommedan laws of inheritance.

(2) An extremely narrow outlook on the part of the cultivators, who are generally small holders. The spirit of dividing the ancestral property into mathematically accurate shares among the descendants entirely dominates all partition proceedings. An extreme case of this is mentioned by Mr. Keatinge where a holding of one-sixteenth of an acre was partitioned among five brothers so that each brother got a holding of one-eightieth of an acre and each of the brothers cultivated each of these five holdings in rotation.

It is rather difficult to overcome any of these difficulties. Drastic legislation is perhaps out of the question at the present moment as neither the Hindus nor the Mahommedans are likely to tolerate any interference with their laws of inheritance. The only remedy therefore lies in the direction of the spread of education and of co-operative ideas and efforts. I think, however, that, to supplement such efforts, it is possible to make laws which will exert a certain amount of indirect pressure on, and offer some inducement to, the cultivators to improve their holdings. With these views the following suggestions are put forward:—

1. It may be enacted that the law will not recognise any partition which will cause subdivision of cultivated plots of land beyond say one-sixth of an acre in area.

2. In the case of transfers of occupancy rights of cultivated lands the landlord's consent shall be refused if the land transferred contained any plot less than one-sixth of an acre in area.

3. All deeds of mutual exchange of plots of cultivated land less than one-sixth of an acre in area shall be exempted from registration fees and stamp duties."

My own view is that any legislation that restricts freedom of transfer as in the first two of Babu Bhutnath Sarkar's suggestions will be liable to abuse and misinterpretation.

QUESTION 8.—IRRIGATION.—(*a*) There are innumerable opportunities for the adoption of petty irrigation schemes by the making of contour embankments or small canals in the undulating portions of South Bihar, Chota Nagpur and Orissa.

The chief obstacles to such improvements are the apathy of the landlords (due partly no doubt to laws which diminish their interest in improvements), and the smallness of the tenants' holdings—which makes the combination of many interests necessary if the simplest of such schemes is to be carried out without the landlord's active intervention.

The more detailed reply to Question 8(*a*) (ii), given below, was supplied by Babu Bhutnath Sarkar, Assistant Director of Agriculture, Chota Nagpur, who has had special experience of the system described.

"(*ii*) I beg to suggest the extension of "Kanke *bundhs*" in the Ranchi district and in other physically similar districts in the Province.

Mr. A. C. Dobbs.

The district of Ranchi is a ragged tract often much broken by numerous ranges or groups of hills, intersected by deep ravines and occasionally by open valleys. The undulating nature of the land has given rise to three primary classes of agricultural lands, *viz.*, (1) uplands or *taurs*, i.e., the tops and sides of the ridges, (2) intermediate terraces or *chaura dons*, *i.e.*, the side slopes of the ravines, which are terraced for the cultivation of early varieties of paddy and (3) low terraces or *garah dons*, *i.e.*, the ravines themselves, which are also terraced for the cultivation of late varieties of paddy.

The upland soil of Chota Nagpur is notoriously poor, largely due to the fact that since the jungles were cleared and cultivation begun, these uplands have been subject to rapid erosion, whereby all the valuable material has been washed out of the soil and only coarse particles left behind.

The most reliable and valuable land in the district is the *garah dons* because they never suffer from drought, as they get a plentiful supply of subsoil water by percolation from land higher up. But, as these lands are made by terracing the ravines which are natural drainage channels through which all the storm water during heavy showers in the monsoon has to pass into the nearest rivers, they frequently suffer from violent rushes of water whereby the *ails* of the paddy fields are frequently broken and a lot of the paddy is washed away. Besides the amount of this sort of land is limited and there is not much room for expansion.

But the intermediate lands, unlike the *garah dons*, do not get much subsoil water by percolation—or at most get it only for a short time, except in a very wet year when they get sufficient water to ripen an early crop. In a short monsoon they dry up very quickly and the crop becomes a total failure. Even a partial failure of the crop in this class of land (the area of which is twice that of *garah dons* in the Ranchi district) may produce scarcity in the district. There are few tanks or *bundhs* in the district to protect these lands from droughts. A system of cheap *bundhs* which divert and hold up the water above such lands has been worked out on Kanke farm. Briefly the system provides, around the sides of a gently sloping hill or bluff, a series of long, narrow comparatively shallow tanks each running roughly along a contour line and with their length parallel to the contours. The effect is not necessarily to supply direct irrigation but to maintain the subsoil water at a high level so that the water soaks by itself into the fields below, through the subsoil, without any necessity for regulation. These *bundhs* cost much less than big *bundhs* thrown across the valleys, and entail much less risk.

The direct benefits to be derived from these *bundhs* are as follows :—

(1) They protect existing *chaura* lands from droughts in the breaks or early cessation of the monsoon.

(2) They enable low lying, waste or indifferently cultivated *taur* lands to be turned into second class paddy lands.

(3) They protect the *garah dons* from violent flooding during heavy storms—thereby saving considerable trouble and anxiety to the cultivators. The area of first class paddy lands is also increased on account of the rise of spring-levels.

(4) They enable the deep and much broken *nullahs* below these *garah dons* to be turned into first class paddy lands.

(5) They largely prevent erosion of the surface soil.

So far, a few of these *bundhs* have been constructed as demonstrations, but we have not been able to make much progress in this line on account of sub-division of holdings, friction between landlord and tenant, improvidence of the cultivator, lack of trained staff, etc. I would, however, urge that Government should give this matter the consideration it deserves and devise means to push on with these *bundhs* in Chota Nagpur as fast as possible."

QUESTION 9.—SOILS.—In my opinion, the improvement and conservation of soil in the ways suggested by this question,—*e.g.*, (i) surface and subsoil drainage, (ii) the application of gypsum, (iii) contour levees—is commonly a matter of topographical detail.

The following detailed answers have been supplied by Babu Bhutnath Sarkar, the greater part of whose service has been in the Chota Nagpur tract.

"(*a*) (iii) In the uplands of Chota Nagpur parallel *ails* along the contours at intervals depending upon the slope, and Kanke *bundhs* are necessary to prevent the erosion of the surface soil.

(*b*) (i) The soil of the Kanke farm has undergone marked improvement".

QUESTION 10.—FERTILISERS.—(*a*) In reply to my invitation Babu Manmatha Nath Ghosh has given the following reply:—

"The use of artificial fertilizers for ordinary field crops will be limited on account of their cost. Of late, there has been a tendency to lower the prices and, as a result, they are being brought into more frequent use with the help of the co-operative banks and by demonstrations in the cultivator's own fields. A small free supply for experimental purposes to selected cultivators in places whereon demonstrations have been made, may be made so as to make the results known widely.

As the natural farm-yard manure is used as a fuel and will be used as such for a long time to come, artificial farm-yard manure may be made as a substitute and its effect demonstrated to the cultivators who should be taught how to make it.

There is a prejudice against the use of bones. Oilcakes are now extensively used, but a larger use of oil-cakes is not possible until the oil industry is developed more fully."

(*b*) Such adulteration should be made penal and the Courts of Law should take cognisance of the matter on the complaint made by the Department of Agriculture.

(*c*) By experiments to test their usefulness and then by successful demonstrations and granting facilities to the cultivators to have these readily obtainable at hand, either being stored by the department or by the co-operative banks.

(*d*) In recent years in this locality, the use of ammonium sulphate for sugarcane and for vegetables like potato and onion has increased. Ammonium phosphate seems to be good for paddy and attempts are being made to introduce it.

(*e*) Experiments are being made with the various forms of rock phosphate for soils proved deficient in phosphoric acid. Sulphate of ammonia has been tried largely on sugarcane and vegetables. No

potash manuring has been tried as no soil has been found poor in potash, except a certain tract in the north-west of the Saran district.

No rock phosphate has yet been found which can approach in effect that produced by superphosphate or other soluble phosphates, but experiments are being still done. Ammonium sulphate has proved a considerable success.

QUESTION 11.—CROPS.—(*a*) (i) There is no visible limit to the possible improvement of existing crops by breeding and selection, combined with the use of artificial fertilisers; both varieties and manures have however to be very closely adapted to local conditions, and I do not think the importance of local investigations for this purpose can be exaggerated. In fact the Agricultural Department should, in my opinion, be organised primarily with the object of such local investigations.

(ii) The testing of the value of new commercial crops and of promising wild grasses and other plants for fodder purposes is a promising line of investigation and requires the same organisation as the improvement of existing crops.

(*b*). (*Supplied by Babu Bhutnath Sarkar.*)

"For the uplands of Chota Nagpur I would suggest groundnuts and soybeans. They can also be used as revenue crops provided there is a market for them."

(*c*) The introduction of groundnuts manured with gypsum, and of Coimbatore No. 213 sugarcane manured with ammonium sulphate, the adoption of *Dahia* paddy in South Bihar, and the discovery of a local perennial grass (*Anthistiria ciliata*) which produces heavy yields of good fodder under heavy manuring in Chota Nagpur, are instances of successful efforts at such improvements.

Babu Bhutnath Sarkar instances *Dahia* paddy, groundnuts, and sugarcane, in Chota Nagpur.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i), (ii) and (iii) The improvement of breeds of livestock, the betterment of the dairy industry, and the improvement of the existing practice in animal husbandry in this Province are in my opinion inseparable, and will depend on the evolution of breeds suitable to each locality and so superior, from the economic point of view, as to compel a complete revolution in the local ideas on the subject of feeding and management.

Assuming the preservation of peace and the maintenance and improvement of communications and hygiene, the formerly extensive grazing grounds, already dwindling, will have disappeared before any considerable improvement of livestock can be affected; and the type aimed at should therefore be one that will pay for stall feeding and will be capable of turning large quantities of by-products to good account.

In this respect the best European milking breeds are a century ahead of Indian breeds and I wish to suggest that the success of the Military Department in cross breeding with Holstein bulls should be followed up by a serious attempt to graft the capacity of that breed for turning food to account on to Indian stocks with their comparative immunity to endemic diseases.

The Army Department works for the economical supply of milk and not for the permanent improvement of cattle, but they have accumulated a large amount of valuable experience, and have the staff necessary for experimenting on a large scale: if they could be induced to formulate a programme for experiment with a view to furnishing

bulls combining the essential qualities indicated above, I would suggest that they should be guaranteed whatever funds and facilities are necessary to bring the experiment to a satisfactory conclusion.

If the experiment were successful—and there is every reason to suppose it would be—there should be little difficulty in evolving breeds of an altogether superior type from the economic point of view, and suitable for every tract in India, by the introduction, once for all, of one or two bulls supplied by the Military Department as a foundation for a herd in any such tract and by subsequent selection from among their progeny. This is not now possible without undue risk of loss by disease when breeding from animals which have not been selected for comparative immunity to Indian diseases as well as for their economic value.

Such experience as I have had goes to show that cattle, as well as plants, have to be closely adapted to local conditions; for instance Bihar bullocks have proved entirely unsuitable for Government farms in Orissa. For this reason I wish to suggest that the Deputy Directors of Agriculture in the several tracts of the Province should be primarily responsible for work in connection with cattle in their tracts and that control should for the most part take the form of a free supply of facilities and information.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*d*) I do not think Government should leave unexplored any plausible possibility of promoting such industries as may increase the value of local agricultural produce and the quantity of by-products available for local consumption.

Whenever investigation shows that there is scope for starting a new industry or extending an old one, Government should, I suggest, be in a position to finance developments by advancing money on debentures to competent managing agencies and to foster continued development by competent scientific (not technical) advice.

As a concrete illustration I append a note by the former Director of Industries* on a proposal that Government should start a sugar factory in South Bihar, together with two notes by myself, as a member of the Board of Industries,† on the question of finance and management.

(*f*) The most promising method would probably be, not to study all existing rural industries, which respond very slowly to changes in the world's markets and additions to the world's knowledge, but to maintain an up-to-date catalogue of economic products derived from every plant or animal that thrives in the area concerned, showing the extent of the market, the price, and the possibilities of extension of the market without a considerable fall in the price. The possibility of manufacturing the most valuable of such products in the locality in which the production of the raw material is of actual or potential importance should then be examined with a view to intensive study of promising industries. I would give as an example the case of soybeans, which grow very well in Chota Nagpur and the products of which are of great value in China and Japan. There is no market for the beans in Chota Nagpur, but there is every reason to suppose that an unlimited market could be created in India itself if the methods of manufacture in the Far East could be introduced; because the general consumption of these products would remedy a notorious deficiency in Indian dietary.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) (ii) The improvement of communications, the opening up of sparsely populated tracts by roads

* *Vide* Appendices I—VII.

† *Vide* Appendices VIII and IX.

and railways, and the establishment of experimental farms to determine the most profitable types of produce in such tracts, are obvious means of initiating permanent migration.

(*c*) Where uncultivated areas consist of grazing land, the establishment of Government farms for breeding and rearing cattle and the provision of facilities for importing and exporting cattle would show the way to settlers.

Where, as in some parts of South Bihar, land has gone out of cultivation because of the intractable nature of the soil nothing but demonstration of profitable methods of cultivation (*e.g.*, for sugarcane) is likely to attract labour.

QUESTION 22.—CO-OPERATION.—(*b*) (i) and (*d*) The following answers have been supplied at my invitation by Mr. B. M. Chatterji, Assistant Director of Agriculture in North Bhagalpur, who has had a long experience of working with co-operative societies in the introduction of agricultural improvements. I incorporate them with my evidence, as further illustrating a point that has already obtruded itself in several of my replies—that rural development in this Province, from whatever aspect it may be approached, requires that propaganda, if it is to have any educational value, must be backed up by practical demonstration that good results may be obtained by following the principles advocated. For this purpose a much larger staff of well-educated, competent, administrative officials is required—which should be more widely distributed in rural areas.

"Credit societies are at present nothing but societies lending at a lower rate of interest than the village moneylender. The non-officials who are to shape its destiny are not taking the amount of interest they should, for various reasons, and the officials are so overburdened with other official routine duties that they have no time to pay proper attention to the development of the societies.

The main duty of the official in charge should be to devote the major portion of his time to the betterment of the society, leaving the official routine duties to his competent assistants. The non-officials will then come forward and combine their efforts, out of respect if not for the pure love of work, with those of the officials, and their combined efforts will do immense good to the societies. In the present constitution the officials have no time to think of the lines on which they should run and develop the societies; thus the guiding force is wanting in the non-officials. The officials, if they are thus relieved of their routine duties, would really be able to improve the societies by bringing the force of other developing departments of Government, such as Agriculture, Veterinary and Industry, into effect. At present the energies of all these developing departments are dissipated for want of real co-operation and guidance.

The result is that the condition of the members of a co-operative society is daily going from bad to worse. The cheap loan encourages them to take more money than they really want and the bank authorities allow the maximum amount possible to the members for fear of keeping the money idle in the bank. The money is not spent judiciously and profitably by the members for want of proper guidance, and recklessly in some cases for want of education, and when the time for repayment comes the society is either liquidated or awards have to be taken against individual members. If very careful statistics are taken it will be found that the loan of an individual member of a co-operative society, in the majority of cases is greater after he has been for five or ten years a member of a society than it was in the early days of his membership.

To solve the problem combined official and non-official control should be more rigidly exercised, as suggested above, and the advantages of the developing departments of Government should be more and more made to be utilised by each and every member of the society."

(*c*) Babu Bhutnath Sarkar supplies the following:—

"Legislation will certainly be necessary if a systematic campaign of construction of *bundhs* is inaugurated in Chota Nagpur district."

The majority of cultivators are, however, very much alive to the possibilities and advantages of water conservation, and Chapter VI of the Bihar and Orissa Private Irrigation Works Act (1922), and Chapter II of the Bihar and Orissa Minor Irrigation Works Act, would probably meet all requirements if Government were to undertake to give active administrative support to those interested in such schemes.

The ryots in this Province require such support firstly against the passive resistance or veiled opposition of the smaller landlords, by whom they are commonly terrorised, to anything that may lessen the ryots, dependence; and secondly in the planning and execution of the work, which will commonly cost at least three times as much as is necessary unless carried out under expert supervision."

It would be one of the chief functions of the *thana* officers who, I propose in my answer to Question 25, should be added to the Provincial Civil Service, to supplement the propaganda of the Co-operative Department, in its efforts to promote a fearless public spirit, by practical help against terrorism of the kind indicated (of which I suggest Government at present takes entirely insufficient cognisance); as well as to make known in all other ways the intentions of Government and the services which it places at the disposal of those who apply for them.

(*d*) I do not think so

QUESTION 23.—GENERAL EDUCATION.—(*a*) My experience of the products of education, in Bihar particularly, is that those who have learnt English are for the most part incapable of expressing themselves without an ambiguity which commonly amounts to conveying the reverse of what they mean or of interpreting instructions in that language in a way that does not imply an inversion of the meaning in some essential particlar.

This makes it almost impossible to teach them in English, as contrasted with teaching them the English language.

The inference is—and I have found it justified over and over again—that for technical purposes English education is almost useless and practical training is far more effective.

Without, therefore, implying that the existing system of general education, in so far as the cultivator may avail himself of it, does not increase his general efficiency as a cultivator, I have to say that I do not think his practice will be altered in any essential particular by any infiltration from above within any reasonable time, of ideas that cannot be expressed in his own language. On the other hand, practical illustrations of both the scope and means for improvement produce an immediate effect on agricultural efficiency, and if it is possible to make use of such practical illustrations for general educational purposes in the common schools—and to adjust the curriculum so as to provide for practical work in, say, a garden cultivated up to the ideals of the Agricultural Department—I think such schools will be of direct value to boys who return to the land, in enabling them

to make greater profits, to the extent that the practice in the school garden is applicable to their land. I would instance particularly the use of certain artificial manures which are of very general utility in areas where they are of any considerable use at all, such as sulphate of ammonia, phosphates, and gypsum. If school boys in such areas were to learn to recognise and use such manures, as an incident in their school education, it would undoubtedly add to their agricultural efficiency and almost certainly increase the popularity of the schools among cultivators. There must be many other petty points of agricultural and domestic economy which might be so taught, if time can be found in the curriculum of the common schools for the practical work involved.

But lessons drawn from such practical work must stress relations or principles so simple as to appeal to students as true within the sphere of their circumscribed experience, and any grouping of such relations as illustrations for teaching purposes will therefore commonly have to include a larger number in each subject than the practical work in any narrower sphere will provide, and will have little reference to the nature of that work—whether agricultural or otherwise. For instance, the work in a school garden or university farm should, of course, be supervised by a competent practical farmer or gardener under expert control; but the teachers should be professional teachers of subjects more commonly studied on account of their general application, or more particularly elaborated with a view to general rather than local economic requirements, than either agriculture or gardening —both of which, if they are not to be actually of negative educational value, must be very highly differentiated with reference to local, physical and market conditions.

Subjects which have been so particularly elaborated with a view to economic requirements must be classed as technical for educational purposes (please see the last paragraph of my reply to Question 1(*a*). Subjects which could suitably be correlated with work in a farm or garden available for purposes of general education would include:— systematic botany, biology, entomology, etc., etc.; several branches of chemistry, medicine, and engineering, genetics, statistics, nature study, drawing, etc., elementary mathematics, mechanics, physics, etc.

(*b*) The only way in which interest in the land can be retained for agriculturists whose ability and culture is improved by rural education is, I suggest, by increasing the scope of the agriculturist in connection with the land in proportion to his increased ability, and his leisure in proportion to his increased culture.

Division and saving of labour are the only methods of attaining these objects and advances in both these directions require the improvement of rural communications and an active policy of development of rural resources.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) Yes. If Government accept it as one of its functions to increase the well-being and prosperity of the rural population, it must, I think, recognise that poverty is cumulative, that its basis is in physical realities which underlie apparent psychological causes, and that only by grappling directly with those physical conditions—not by any mere increase of propaganda —can the necessary radical change be effected.

The approximation of the atmospheric to the bodily temperature in India makes physical labour peculiarly exhausting, while a vegetable diet that supplies enough of the elements essential to the support of

brain work and nervous energy must usually provide far more nutriment than the body can absorb with impunity in a hot climate. Dietetic investigations might remedy the latter difficulty, but only better organisation of local resources than that of her competitors in colder countries can enable Indian labour to compete with those competitors on equal terms as regards individual efficiency.

The Indian cultivating labourer, with a physical disability due to the climate, carries a greater handicap than his competitors; and only by a reduction of his load, to suit his capacity and circumstances, by means of superior organisation of local resources can he hope to avoid becoming a dependent on the outskirts of civilisation. If Government intend to effect such a reduction of his handicap the organisation of local resources must be regarded as part of its regular administrative functions—entailing an extension of the administrative machinery and readjustment of its perspective. The idea that it is possible to make up for physical deficiencies by superior precepts must be abandoned in favour of an active policy of economic and sanitary development.

Existing legislation such as the Village Administration Act and Minor Irrigation Works Act in this Province already provide a partial framework for such a policy, but the administrative machinery is entirely insufficient even to give effect to local initiative—much less to take the initiative itself.

A comprehensive policy of rural development could perhaps be initiated by posting an officer of the Provincial Civil Service to every revenue *thana*, to act as a focus for all the local interests as well as to represent Government. He should be given as much power as possible for all purposes and his work should be inspected, and written advice given, by officers of all departments. But he would be responsible only to the sub-divisional and higher revenue and magisterial authorities, and as there are over 240 *thanas* in the Province—approximately four to each sub-division—it would probably be necessary to duplicate the sub-divisional staff for general administration in order to deal with the increase in references that so large an increase in the lower grades of the service would imply.

Each such officer would have a budget grant for "Minor Works" from which could be financed schemes for local improvements approved by the several departments concerned and by higher authorities in proportion to the expenditure involved.

The revenue for these purposes might, as suggested in my answers to Questions 5 (*a*), 6 (*b*) and (*c*), be derived from taxation of incomes secured by law on contracts, imposed in order to pay off debt and provide a surplus for productive investment.

Such investments might take the form of perpetual debentures secured on the increased value of the assets for the development of which the money was advanced.

As revenue increased, taxation could be remitted and the interest on debentures decreased.

QUESTION 26.—STATISTICS.—(*a*) The seasonal crop statistics collected by my office are notoriously worthless—being based on pure guess work by the police *chaukidars*. For instance, the estimated yield of the castor crop for the three years 1917-18 to 1919-20 accounted for less than one-third of the net exports from the Province in the corresponding period 1918-19 to 1920-21.

The only apparent means of putting these statistics on a sound basis is to devise and prescribe a special system for checking the area and yield of each crop by random-sampling. Mr. J. A. Hubback, I.C.S., has done a good deal of work in this direction on the rice crop, following a report on a preliminary survey of the crop in one subdivision by Babu Bhutnath Sarkar, Assistant Director of Agriculture, who was specially deputed for the purpose. But no definite advance will, in my opinion, be made until a whole-time officer thoroughly familiar with statistical theory is appointed for the purpose; and it is doubtful whether any use to which the majority of the statistics are put can justify the expenditure that would be involved in relating them to actuality.

APPENDIX I.

NOTE (DATED 11TH SEPTEMBER, 1926) ON THE POSSIBILITY OF INTRODUCING WHITE SUGAR MANUFACTURE INTO SOUTH BIHAR.

(By Mr. B. A. Collins, formerly Director of Industries, Bihar and Orissa.)

Although India has a larger acreage under sugarcane than any other country in the world, she also imports very large quantities of sugar, and in 1913-14 her imports were 800,000 tons of which some 600,000 tons came from Java and 140,000 tons from Mauritius. During and after the War the imports fell off considerably owing to shipping difficulties and the great demand of the United States of America for Java sugar and in 1920, the total imports were only 400,000 tons. The need for these imports arises because the average yield of cane per acre is extremely low (about 10 tons as compared with 50 or 60 in Java), while the indigenous method of treatment of the cane to produce *gur*, *rab*, etc., is extremely wasteful. It is calculated that by it only 3 to 4 per cent of sugar is produced from 100 tons of cane, as against 8 to 9 per cent extracted by the modern white sugar factory. The improvement in the outturn of cane per acre is an agricultural problem which is engaging the attention of the Imperial and Provincial Agricultural Departments and need not be discussed here. Unless it can be solved satisfactorily, however, there is no chance of India producing all the sugar she requires. The other factor, however, depends on the more general introduction of modern scientific methods of manufacture into the country. The spread of cultivation and the improvement in the yield of cane per acre is prevented at present by the impossibility of the cultivator crushing more cane with his bullocks and small mill. This is proved by the fact that wherever a large modern factory is erected the acreage under cane rapidly increases. This may be observed especially in the districts of Saran and Darbhanga. The substitution of modern methods of extraction is therefore of the greatest importance because it not only means that the cane now grown produces more than double the amount of sugar but actually leads to an increase in the area under cane.

2. Sugar cane is grown in Bihar and Orissa mainly in the two divisions of Patna and Tirhut, although there is some cane planted in South Monghyr, Bhagalpur and the Kishanganj *thana* of Purnea district. Bihar and Orissa is the chief producer of white sugar in India. There are ten large factories actually at work, the minimum combined crushing capacity of which for next season will be nearly 3,000 tons of cane per day while their output of white sugar for the present year may be placed at about 17,000 tons. In addition to this, a fair amount of *gur* is refined and the exports of sugar by rail in 1920 reached 25,000 tons. Over half of this goes to the United Provinces and the balance to the Punjab, Central India, Rajputana, Nepal and the Central Provinces. All the factories producing white sugar are situated in Tirhut, although cane cultivation is quite as dense in Patna, and the production of white sugar has hitherto been almost entirely in the hands of Europeans. The reason of this unequal distribution of the sugar mills throughout the Province is that it is out of the question to put down in any place a large sugar mill representing several lakhs of rupees capital, unless the promoters of the enterprise can be certain of a supply of cane. Bihar is a country of small peasant holdings and it is only where the European planter has existed for a generation or two and has considerable areas in his own possession, on which he can grow cane in rotation with indigo, and has also by years of square dealing obtained

the confidence of the cultivators to such an extent that he can rely on purchasing cane in a free market that these conditions are satisfied. Further, owing to the fact that the capital for these enterprises has been almost entirely provided by Europeans it is natural that the management has rested in their hands. If sugar cultivation is to be extended into South Bihar, where no large tracts can be obtained for direct cultivation, and is at the same time to form an outlet for Indian enterprise, some means of acquiring the confidence of the cultivators must be sought; but it is probable that its growth will be only gradual. A partial solution may be found if local landlords and moneylenders can be induced to subscribe a substantial portion of the capital, but any attempt to go too fast may lead to disaster.

3. So far as the actual manufacture of sugar goes, prospects in South Bihar are more favourable than in Tirhut. Analyses of the canes grown show that they are better canes for mill purposes than the North Bihar canes, while the fact that the cane is all irrigated would make it possible to increase the crushing season by at least a month. The only difficulty is the supply of cane. It is no secret that South Bihar has been carefully reconnoitred by firms with long experience of sugar manufacture and rejected for this very reason, while the two or three companies formed for the express purpose of setting up mills in South Bihar have all failed to raise sufficient capital. If sugar manufacture by modern methods is to be introduced into this area—and its introduction is extremely desirable from every point of view—it will be necessary for Government either actually to pioneer the industry or else to offer some sort of guarantee to some firm ready to undertake it.

4. Before discussing this further a word may be said as to the size of the factory required. During the past year the department has carefully explored the possibilities of introducing small plants for the production of say one or two tons of white sugar daily. Great pressure has been brought on the Director from all sides to recommend plants of this and smaller sizes to would be manufacturers; but this has been steadily resisted. It will be seen that the recommendations of the Sugar Committee are strongly against such plants and only in favour of plants of such a size that their overhead charges come under a reasonable figure and render them able to stand competition in normal times. Whether the new import duties have altered the position remains to be seen, but it must be borne in mind that competition within India itself is likely to be a real factor in the future.

5. On the whole, after careful consideration of all possible means of proceeding, I have come to the conclusion that Government itself should put down a sugar plant capable of crushing 50 tons of cane a day at some suitable centre in South Bihar (probably at Dehri-on-Son). Such a factory would, it is hoped, attain the three following objects: (1) the question of whether such plant, which represents about the economic limit in small plants, could complete with larger plants would be settled; (2) the system of the free sale of cane to central factories by cultivators would be introduced into South Bihar and could be gradually extended; and (3) a station would be available in which Indians could be trained in the chemistry and engineering of sugar manufacture.

* * * *

7. The last point for consideration is whether Government should itself start a pioneer factory or try to arrange for one to be put up by private enterprise on a Government guarantee. I was at first in favour of the latter course but have now changed my mind, chiefly because it

is essential that cane purchase, which is the most important aspect of the experiment, should be started under the best possible conditions. It is desirable also that the plant should be the most efficient procurable and should be run under the best supervision available. The Indian Sugar Committee for much the same reasons insist that Government should finance and manage the factory which they propose should be put down on the western border of the United Provinces (*vide* paragraphs 345 and 346 of Report). It is the opinion of Mr. Robinson, Deputy Director of Agriculture, also, who has made careful local inquiries, that the advent of a Government factory would carry considerable moral weight with both zamindars and cultivators. The value of this prestige in obtaining the confidence of the cultivators is very great and should not be sacrificed, unless it is absolutely impossible for Government to procure the funds. It is only if this is impossible that we should have recourse to private enterprise and it will then be necessary for Government to guarantee say 6 per cent on the capital outlay. I trust, however, that it will be possible to provide the money from the Loans Budget, since the experiment will be in the nature of an investment which, according to the best advice obtainable, is not only safe but extremely profitable. Further, as soon as the industry is on a sound footing, it would be possible to hand over the factory to private enterprise. In the meanwhile, any profits received in excess of the usual interest on capital can be utilised for the reduction of the loan.

8. Owing to the delay in the publication of the Indian Sugar Committee's report, this project was prepared and this note was actually in proof before the report was issued, and it seems desirable to insert a paragraph to deal with some of the points raised by the committee. In the first place South Bihar undoubtedly produces a good eating *gur*, which is exported in large quantities to the Central Provinces, and it might be argued that the advice of the committee that factories should eschew such areas (*vide* paragraph 320) applies to it. The quality of *gur* produced, however, cannot, I am informed, compare with that made in the special districts to which the committee refers and they did not intend their remarks to apply to South Bihar. Local inquiry, also, shows that cane will be forthcoming. It is not proposed at first to acquire any land for setts, as proposed in paragraphs 311 and 312. This might make the factory unpopular, while it is not really needed. It is also not possible in a small factory of the type proposed to arrange for the elaborate chemical control suggested in paragraph 337. Should these small factories succeed, highly paid chemists might be employed by a group of factories on a co-operative basis. Lastly, it will certainly be desirable to give out manures at cost price, but this can be arranged out of the working capital provided (paragraph 327).

* * * *

10. In conclusion, I may quote the last two paragraphs of Mr. Wynne Sayer's recent Review of the Sugar Trade in India during the year 1920.

"It is clear from this review that India has a capacity for consumption of 748,544 tons of foreign sugar. And she is perfectly capable of finding over 15 crores of rupees to meet her additional sugar purchases from abroad. As the prices of sugar began to fall in September 1920 a distinct tendency to import more became evident, despite the extra duty imposed, which leads one to infer the somewhat curious fact that 15 crores of rupees represents about the amount India is prepared to put into purchases of foreign sugar and the lower the price the higher the tonnage.

Mr. A. C. Dobbs.

As India's production of refined sugar is at present only 177,560 tons it is obvious that there is ample scope for many times the number of factories now working in India. The prospect before the Indian sugar industry is very hopeful, as it can choose most favourable parts of the country for supply for many years to come, and with the increased duty on foreign sugar coupled with heavier freight and handling charges it would be well if capitalists devoted their time and attention more and more to developing the industry on a sound and scientific basis. There is ample scope and the rise in the cost of production throughout the world, both of raw material and of the finished product, has told heavily in India's favour, as all commodities which have to seek a distant market are taken toll of by conditions which a producer working in a home market never experiences. The value of this fact has not yet been sufficiently grasped in India."

APPENDIX II.

Capital required for a small sugar factory capable of crushing 60 tons of cane daily.

	Rs.
1. Machinery.	2,55,000
2. Freight and insurance	28,000
3. Factory main buildings, weigh bridge, etc. . .	56,000
4. Quarters, etc.	30,000
5. Erection of machinery	10,000
6. Land acquisition	6,000
7. Reserve for contingencies and initial expenses .	17,000
8. Working capital	1,00,000
Total .	5,00,000

N. B.—This estimate has been framed on liberal lines and it is hoped that there will be substantial savings under some of the items.

2. The estimate for buildings includes—

	Rs.
(1) Bungalow for the manager	9,000
(2) Two quarters for the foreman and head clerk .	4,000 each.
(3) Ten bachelor quarters with verandahs and cook-houses	800 „
(4) Fifty grass huts	20 „

3. It is hoped eventually that most of the subordinate staff will be trained in the locality and it is not necessary to provide permanent accommodation all the year round for more than three officers and ten menials. Bikramganj itself, which has a large bazar barely one mile distant, should be able to afford accommodation for many of the hands. The buildings contemplated will be of a cheap type and the figures are based on line plans and plinth area estimates provided by a firm of contractors.

APPENDIX III.

Estimate of revenue and expenditure for 120 working days.

Expenditure.	Amount.	Revenue.	Amount.
1	2	3	4
	Rs.		Rs.
Cost of 200,000 maunds of cane at 8 annas.	1,00,000	200,000 maunds of cane at 7½ per cent extraction—15,000 maunds of sugar at Rs. 15 per maund.	2,25,000
Cost of staff (see Appendix IV) .	23,000		
Manufacturing charges . .	9,000	6,000 maunds of molasses (3 per cent extraction) at Rs. 1-8-0.	9,000
Marketing charges . . .	6,250		
Miscellaneous, including repairs, renewals, insurance, etc.	4,300		
Interest on capital at 6½ per cent per annum.	32,500		
Depreciation on 3½ lakhs at 8 per cent.	28,000		
	2,03,050		2,34,000
Profit .	30,950		
Total .	2,34,000	Total .	2,34,000

N. B.—The expenditure on staff is explained in Appendix IV. These estimates have kindly been furnished by Messrs. Begg Sutherland and Company as a result of their experience of all their factories extending over a number of years and I am assured that liberal provision has been made for all possible items including fuel, selling commission, gunny bags, lime-stone, etc., etc.

2. Extraction has been taken at 7½ per cent but it is hoped to get at least 8½ per cent, which would add another Rs. 30,000 to the profits. At Marhaura last year the average for the whole season was 9·6 per cent and this year it will work out to at least 9·7 per cent. At the time of writing the percentage being obtained is 11 per cent. As against this likely increase must be set the fact that one-third of the sugar produced is "seconds" which fetches 8 annas a maund less.

Mr. A. C. Dobbs.

APPENDIX IV.

STAFF.

Description.	5 months.	7 months.
1	2	3
Engineer manager	1 at Rs. 700 per month=700.	1 at Rs. 700 per month=700.
Foreman..	1 at Rs. 120 per month=120.	1 at Rs. 120 per month=120.
Combined head clerk, store-keeper and cashier.	1 at Rs. 80 per month=80.	1 at Rs. 80 per month=80.
Assistant clerk and time-keeper ..	1 at Rs. 40 per month=40.	....
Weighment clerks	2 at Rs. 50 per month=100.	....
Peons	6 at Rs. 12 per month=72.	2 at Rs. 12 per month=24.
Mistris	2 at Rs. 35 per month=70.	1 at Rs. 35 per month=35.
Engine man	4 at Rs. 15 per month=60.	1 at Rs. 15 per month=15.
Boiler attendant	2 at Rs. 20 per month=40.	1 at Rs. 20 per month=20.
Sugar boilers	1 at Rs. 150 per month. 1 at Rs. 80 per month=230.	2 on half pay=115.
Centrifugal men	4 at Rs. 15 per month=60.	....
Carbonatation men..	2 at Rs. 15 per month=30.	1 at Rs. 15 per month=15.
Coolies	80 at Rs. 12 per month=960.	8 at Rs. 12 per month=96.
Total ..	2,562×5=12,810	1,220×7=8,540
	Total .. 21,350	

N.B.—For the purposes of the estimates Rs. 23,000 has been taken. Some of the staff will be taken on for the season only and the remainder only will be paid for the whole year. The extra provision made will enable reliefs to be employed so as to conform with the Factories Act.

APPENDIX V.

Prices of Indian sugar in 1921—1923.

	January.	February.	March.	April to June.
1921 ..	Rs. 22 to 25/8	Rs. 24/8 to 27	Rs. 27/8 to 29	..
1922 ..	Rs. 15 to 17	Rs. 17	Rs. 17 to 17/12	Rs. 17
1923 ..	Rs. 16/8 to 16/12	Rs. 16/12 to 17/12	Rs. 17/12 to 20/4	Rs. 17/12 to 20/4

N.B.—These are prices in rupees per maund of sugar which corresponds closely in quality to Java T. M. O. as quoted in "Capital". This is double carbonatation sugar.

APPENDIX VI.

The double carbonatation process is chiefly associated with Java. The merits of the three main processes are discussed in the Indian Sugar Committee's report (paragraph 336) and it is said that carbonatation is the most expensive to instal and work, that given equally scientific control, the extraction is the same for all three processes, and that on the whole the sulphitation process is the more suitable for India. This was published in 1920. Messrs. Begg Sutherland and Company strongly advise me to adopt the carbonatation process. They have found by experience that it is pre-eminently suitable for Bihar. In the first place it does not require careful scientific control to obtain the best results, but is to some extent fool proof; secondly, it enables sugar to be extracted equally well from the dried up cane available at the end of the season, when the west winds are blowing; thirdly, it gives a white sugar as good as standard Java sugar and readily saleable on sample at any time (whereas no one will buy sulphitation sugar without bulk inspection); and fourthly, in South Bihar limestone is available very cheaply. In practice, in their factories they are getting wonderful results from this process and are installing it in all their factories, as soon as funds become available. On the other hand, no factory working the sulphitation process in Bihar is getting anything like the results obtained by carbonatation. They usually average about 8 per cent or less; in fact, the average for Indian factories is 6·85 against 9·75 in Java, although the latter figure can be and is now being obtained by the carbonatation process in Bihar.

It is the results of this process which chiefly encourage me to proceed with the scheme. It is obvious that the whole profit of sugar making is bound up with the question of percentage of extraction. In this small factory, the difference between 7½ and 9½ per cent might make the whole difference between success and failure. Each 1 per cent means an extra revenue of Rs. 30,000 annually.

APPENDIX VII.

A site has been selected in the canal area about a mile north of Bikramganj on the Arrah-Sasaram Light Railway. The factory will be a few yards only from the road and railway and close to the meeting point of four metalled roads. There is plenty of cane on all sides and more land suitable for growing it. Promises of local support have been received both from influential zamindars and the cultivators themselves.

Mr. A. C. Dobbs.

APPENDIX VIII.

BOARD OF INDUSTRIES.

NOTE BY THE DIRECTOR OF AGRICULTURE, BIHAR AND ORISSA, ON THE PROPOSAL TO START A SUGAR FACTORY UNDER GOVERNMENT MANAGEMENT IN SOUTH BIHAR.

The proposal to initiate a factory for purely economic purposes at a cost to Government of Rs. 5,00,000 constitutes a new departure in policy; and as a precedent that is likely to be widely followed, if successful, it seems to require the very careful consideration of the Board, the more so if, as seems probable, this first departure proves a success.

Accepting all the arguments advanced by the Director of Industries in favour of the other points of the scheme proposed, it seems to me that the really important point for consideration is that discussed in paragraph 7 of Appendix I of his note, whether Government should itself start a pioneer factory, or try to arrange for one to be put up by private enterprise on a Government guarantee.

Does either of these alternatives represent the best course to adopt? Would not all the essential requirements of the situation be met by an offer by Government of debenture capital to a private company that would erect a factory in co-operation with Government, taking all risks, and all the profits, after paying Government its interest?

The principle at stake is a very important one, namely that Government should use its financial power to maintain essential principles—in this case to secure the confidence of the cultivator and the collection of information of economic or scientific importance—without meddling in commercial details.

Experience shows that the great difficulty in the control of Government experts is to keep practical considerations in view. The release from financial responsibility which a Government guarantee, in any form, gives to the executive staff makes it very difficult to ensure the regard for economy that is absolutely essential if the experience gained is to be of any commercial, or in fact real, value. Government help towards a private guarantee is, I believe, the ideal solution of this problem.

As an illustration of the kind of arrangement that might be designed to further important public interests, while avoiding executive interference by Government, I would suggest that in this case Government should offer to subscribe, say Rs. 5,00,000, as debentures perhaps retaining the option of converting part of this sum into ordinary shares for sale and should ask, say, Messrs. Begg Sutherland and Company, to find the balance necessary to build and work a factory of whatever size they consider most suitable and to appoint a managing director and a majority of a board of directors.

Government would itself appoint an engineer or a chemist, or both and perhaps the Collector, as directors—their business being to advise the company, each in his own sphere, and to report to Government.

Any of the directors would of course have access to all the accounts and records of the business, and Government should also have the power to attach subordinate officials to the factory for the purpose of collecting any information or taking any scientific observations that the Government directors might require.

APPENDIX IX.

EXTRACT FROM DEMI-OFFICIAL LETTER NO. 2655 OF 27TH APRIL 1923, FROM THE DIRECTOR OF AGRICULTURE TO THE DIRECTOR OF INDUSTRIES, BIHAR AND ORISSA.

Briefly I would go as far as possible in the direction of (i) assuring Government that a proposition is sound, and (ii) on the basis of that assurance putting up a factory at Government expense and leasing it to men who have the technical knowledge and business experience necessary for efficient management.

Apart altogether from efficiency, the main object is to create a class of working capitalist instead of fostering that bane of capitalism—the rich absentee.

A farmer prefers to use his money as floating capital under his immediate control and thus obtain more scope by leasing a large farm than he would by buying a small farm outright; and *pace* the purely literary cult of the small holder, experience has amply demonstrated that he is right. Similarly, the ideal industrial system is for the manager of an existing factory to get together enough money to hire a factory on his own account, taking all the profits after paying the rent—which would in the case of Government factories become a revenue assessment. There would of course be, as in the case of land, a considerable tenants' interest which would include goodwill, which an incoming tenant would pay, and which would commonly cover any possible depreciation of the machinery and plant, thus protecting the landlords' interest.

The great advantages would be (i) direct management and (ii) competition of capital. These are the only possible ways of competing with large aggregations of capital, which have to work through middlemen and to make up for this disadvantage by manipulating prices, first to destroy competition and then to increase profits.

In the absence, at present, of an independent class of Indian managing directors it will be necessary at first to approach operating companies such as Begg Sutherland. This does not affect the principle at stake, and a beginning is necessary in order to seize a favourable opportunity to create the condition precedent to success in less favourable circumstances.

This condition for ensuring success is authoritative knowledge of facts and men, such as can only be accumulated by a body of scientifically qualified directors acquainted at first hand with technical details and with the character and qualifications of the rising men on the staffs of existing factories.

A comparison of the nature of the experience that would be obtained by an engineer and a chemist, studying technical details in a factory, with that obtainable by, say, Sayer and yourself from casual inspections of factories and balance sheets will I think, if you have ever superintended any technical operation, be sufficient to enable you to realise the exceedingly strong position you would be in, in considering any similar industrial proposition, if you were assisted by a body of such scientific directors who had had special experience and obtained authoritative knowledge in sugar factories, paper mills, tanneries, etc. You would shortly have an unrivalled body of scientific advisers which would enable Government to approve and promote industrial undertakings with assurance, and to recommend a competent staff for any undertaking if those who provided the working capital required such recommendations.

Mr. A. C. Dobbs.

The alternative, of inducing rich Indians who have no technical experience to speculate in small industrial projects, however promising, on a Government guarantee must in my opinion end, after whatever interval of apparent prosperity, in disappointment and the destruction of confidence; because between rich absentees the amount of capital controlled is necessarily the deciding factor; and only Government, aided by the self-interest of a staff dependent on their own exertions for their profits, can withstand the sustained aggressiveness of modern capitalistic combinations.

Oral Evidence.

65,371. *The Chairman*: Mr. Dobbs, you are Director of Agriculture in the Province of Bihar and Orissa?—Yes.

65,372. Would you give us, please, quite shortly, an account of your own training and past appointments?—After leaving Cambridge in 1896 I took up a dairy farm in Ireland of about 300 acres. In 1899 I was appointed for three years a temporary Assistant Commissioner on the Irish Land Commission in connection with the fixing of rents. In 1903 the Purchase Act halved the number of Assistant Commissioners and they got rid of me. In 1904 I was working at odd times for a few months under the Purchase Acts and then I decided to go to the Agricultural College at Cirencester to qualify with a view to becoming a land agent. I heard of the appointments in the Indian Agricultural Service and in the year 1906 I went up for a diploma at Cambridge and got it, after which I came out here. I came out as Principal of the Punjab Agricultural College. After two years I did not see much prospect of use for the College there and accordingly asked to be transferred to some other Province, as a result of which I was sent to Bihar. I was posted as Principal of the Agricultural College at Sabour but thinking that there was still less use for a College there, I once more asked to be transferred and, as a result, I was made Assistant Inspector-General of Agriculture. I was at Pusa for three years. Then the local department was expanded in Bihar (there having been only one Deputy Director, up till then), and in 1915 I went to Ranchi as Deputy Director of Chota Nagpur. I was there for five years when I was appointed to officiate as Director of Agriculture in addition to my own duties in January 1919, and I have been working as Director ever since.

65,373. On page 49 of your note, in answer to Question 1 (*a*), you make the suggestion that the Patna University should be equipped for assisting the officers of the Agricultural Department in approved investigations. What class of investigation are you thinking of there?—I was thinking largely of chemical analyses, and technical work in botany requiring considerable botanical skill, such as crossing different varieties of plants, some of which are very difficult to cross, and also work in connection with statistics.

65,374. Is the University not equipped for such work at this moment?—No; they would not undertake chemical analyses or anything of that kind for us. They have no Professor of Genetics or anything of that sort. In fact I believe that it is pretty hopeless to expect that they would create the number of Professors that we should like to see created.

65,375. Are you suggesting that there should be an arrangement by which Government would finance these additions to the staff and physical equipment of the University?—They would have to, I think.

I suggested at one time that they should give honours to anybody who came forward to endow Chairs in certain subjects, but I doubt if that is practicable. It would mean very large donations.

65,376. As part of your answer to the same question, namely 1 (*a*), under the heading 'Administration' you suggest the creation of a post the holder of which is to be known as Scientific Commissioner. Is it your idea that the Scientific Commissioner should be, in fact, a Development Commissioner, that he should be responsible for co-ordinating the work of, for instance, the Agricultural and Co-operative departments, and so on?—Yes, anything in the nature of scientific work ought to go to him, also irrigation projects and things like that.

65,377. You are crossing over there from the Transferred to the Reserved group, are you not?—I mean to say that he should be consulted on the agricultural implications of the project.

65,378. Do you suggest that this officer himself should be a skilled statistician, or that he should be provided with that skill in his office?—He ought to be able to control the statistician, to know whether the man is good or is not good. He would have to have more of a mathematical rather than a classical training.

65,379. On page 50 you say, "Failing the emergence of any one in the Agricultural Service apparently competent (even after special training, for which study leave should be freely allowed to promising men) to succeed a Director of Agriculture who was within five years of retiring age or within sight of promotion, an outsider should be recruited on special contract, or seconded from some other department, for a year or two on probation as a Deputy Director of Agriculture". Do you contemplate, there, attaching a member of the Indian Civil Service?—Yes, I think that would be quite a good thing.

65,380. If you were going outside the country for a man of that sort, you would have, if you wish to attract the right class of man, to provide him with reasonably attractive terms, would you not?—Certainly.

65,381. A man, being of good standing and having good prospects, would hardly come out to India at that stage of his career, unless he was reasonably certain of obtaining the post after his period of probation, or of being granted some *quid pro quo*?—That is so.

65,382. Are you familiar at all with the manner in which, in certain parts of the Empire, candidates for agricultural and other appointments, so far as those members coming from Great Britain are concerned, appear before a selection board?—I have no experience of that.

65,383. You give us here, and we have also been given in the provincial memorandum, a complete statement of the disposition of the personnel of your department throughout the Province, and I have no questions to ask you on that at this stage. I wish to know, however, whether any plan is in the making to deal with the situation which has arisen as a result of the Lee Commission's Report, according to which it will fall to the Province to provide itself with Superior Provincial Agricultural Service men?—What we have been doing lately is to advertise for Bachelors of Science and then to send them up before a selection board, after which they are appointed as probationary Assistant Directors. They then go on to the farm for training and if, after two years, they are found useful they are appointed as Assistant Directors. Nothing more than that is contemplated at the moment.

65,384. You have, of course, no facilities for post-graduate training in the Province?—None at all; but after these men have been appointed as Assistant Directors I hope to send them either to Pusa or Bangalore where they may receive special training in some particular line. They might select plant breeding, or cattle management, and so on. Then I made another proposal. In reply to a letter that Dr. Clouston wrote to me sending me a note submitted by Mr. McKerral of Burma, I suggested that a central rural University should be established, where post-graduate training could be given.

65,385. Did you choose the site?—I suggested Bangalore.

65,386. You prefer that to Pusa?—Yes.

65,387. Why?—Because I do not think that you would get good men to stay at Pusa which is much too hot a place. Dr. Atkins came out to Pusa and he was a very good man indeed, but he went home almost immediately because he could not stand the heat at Pusa.

65,388. How long was Mr. Howard in this Province?—For several years. He is rather an exception.

65,389. In the matter of his capacity or in the matter of his withstanding heat?—We do not often get men of Mr. Howard's type selected; he is an exceedingly good man in his way.

65,390. Are you yourself satisfied with the present state of affairs with regard to agricultural education?—No; I am not.

65,391. Do you think that a Province of the size and agricultural importance of Bihar and Orissa should be in a position to give agricultural training locally to those citizens who require it?—I do not think there will be enough men coming forward to take advantage of that facility.

65,392. Broadly speaking, do you approve of the action of closing the Sabour College?—Yes; I do.

65,393. How do you account for the fact that in other Provinces active agricultural institutions are maintained whereas, apparently, in Bihar and Orissa it is not possible to attract suitable students?—There are two reasons. One is, that English education is, I think, poorer in Bihar and Orissa than in a great number of the other Provinces; the other is that, in most of the other Provinces, the agricultural colleges are affiliated to the Universities, but the college here was not affiliated; and the one object with which people go into the college is to get a degree. Therefore, there is nobody here desiring to go to the agricultural college.

65,394. Do you approve of the idea of affiliation for the purpose of degree-giving?—If the course is not made too hard, and if Government wish to give that kind of education and to give a degree for it, and wish the college to be affiliated, of course, it would fill the college directly. But for the Agricultural Department to attempt to teach elementary science to people who do not understand English is simply waste of our time.

65,395. Do you look forward to a day when primary and middle school education will be so imparted as to make it possible to open a successful agricultural college in this Province?—Yes. I think it might be possible a hundred years hence, if the right kind of subjects were taught to attract cultivators: farm management, management of animals, plant breeding; the farmer does not want to be taught elementary science; but he would like to know the very latest result of manurial experiments.

65,396. Do you not require an agricultural college for training men for your department?—No; for the Subordinate Service I would take the people with the best general education and I would train them on the farms.

65,397. On page 559, in answer to Question 2 (v), it is stated: "Service in the Agricultural Department and with private proprietors. At present Messrs. Shaw Wallace and Company of Calcutta have organised propaganda for ammonium sulphate and a good many who are not able to secure Government service have found occupation there. I know only of two persons who have started farms of their own and they are said to be prospering." Are they in this Province?—I believe so. That is the evidence of the Assistant Professor of Chemistry.

65,398. Is it your view that demonstration in this Province has had a fair share of funds and attention as compared with research?—Yes; so far as it has gone, we have never had difficulty in getting funds. The difficulty is to get subordinates with sufficient agricultural training to give demonstrations. It is no use sending out a man who knows nothing of cultivation; the cultivators will think that he is a fool and will not pay much attention to him. This work of training men is a slow business. The Deputy Directors can train them on the farms, but we have not yet been able to tackle demonstration on a large scale.

65,399. On page 55, it is suggested that it is the business of Government to demonstrate successfully that farming can be made to pay a handsome dividend. Could you find land and opportunity, if you were a free agent, with which to make a handsome dividend out of farming?—This again is Babu Bhutnath Sarkar's view. Would you refer to page 54, where I give my own? I say there: "My own view is that it is impossible for any one who has not himself been brought up to manual labour to make agriculture, as such, pay for supervision in competition with labouring cultivators instructed by a scientific agricultural department and organised for co-operation under Government auspices." If my own department and the Co-operative Department develop as we hope, I do not think anybody who is paying for his labour will be able to make farming pay. I generally, as a matter of fact, discourage men from putting money into farming.

65,400. Are there in this Province any considerable blocks of uncultivated land which are fit for cultivation?—I think in some parts of the Province there are such blocks; I think land could be procured. I do not know; the Revenue Department might be able to tell you.

65,401. On page 57, in answer to Question 4 (*b*), you say: "The work of scientific experts under the Government of India should, in my opinion, be controlled by inspection and review by scientific officers of the calibre of Fellows of the Royal Society of whom, for instance, Sir Gilbert Walker might have been one." The surveillance of the work of all experts working under the Government of India would be a very considerable burden to lay on these gentlemen, you know?—Yes; but practically only the best workers would be able to get the benefit of their advice. In reply to Dr. Clouston's letter sending me a copy of Mr. McKerral's note, I have suggested a better way. May I put it in the form of a note?*

65,402. Do, please. In answer to Question 4 (*a*), you say: "Pusa has never taken or been given the place that it might have occupied as an institution for training the best brains that the provincial educational system could produce for the scientific investigation of practi-

* *Vide* Appendix I.

cal agricultural problems." That raises the question of Pusa in relation to this Province. Would you tell the Commission, quite shortly, whether Pusa has been able to make any contribution towards the solution of your agricultural problems in Bihar and Orissa, and if so, what contributions have been made?—Well, we have Mr. Howard's wheats which are about five to ten per cent better than the local wheats; their cattle have been of great help to us; then there is the work on sugarcane. We have not touched North Bihar at all, as there is a feeling that we can get that work done by Pusa. We have always relied on Pusa. Pusa, of course, is not out to do local problems, but they could not help doing something for North Bihar; for instance, Pusa wheats have been very useful to us, and then their sugarcane. Whenever we propose doing anything for North Bihar, the local Legislative Council say: "Can we not get Pusa to do that work."

65,403. Could you give us an idea of the acreage under improved canes as a result of propaganda by Pusa?—No, not off hand.

65,404. Has Pusa done any training of personnel for you?—No; none at all.

65,405. Have any of the personnel of your department been to Pusa for training?—No, except Mr. Sethi, the Deputy Director in Orissa. He came out from home. He was appointed Deputy Director, and he was at Pusa in the ordinary way like others.

65,406. Is any inspection or surveillance of any part of your staff carried out, or has it at any time been carried out, by Pusa?—There was a special scheme sanctioned, under which Mr. Sayer, the Secretary of the Sugar Bureau, had three or four overseers and a dozen *kamdars* appointed by this Government for the purpose of extending sugarcane.

65,407. Have any costing operations been carried out by Pusa which have been of service to the Province?—Not that I know of.

65,408. Costings, for instance, of cultivation by heavy tractor or by heavy traction engine?—I think there was a bulletin published on the tractor at Pusa, but I do not know that it was very accurate, or that the details were gone into very carefully. I do not remember.

65,409. However valuable these services are, they are incidental to the Imperial station having had to be placed in the Province, and they are not really the proper function of the central station. Is that your view?—Yes.

65,410. They show, however, an evidence on the part of your department and Pusa to work happily together?—Yes.

65,411. In answer to Question 5 (*a*), you suggest that Government should be responsible for making certain advances, which should be used in the first instance for paying off encumbrances. Are you thinking there of some system akin to a land mortgage bank?—I think myself that it is much better for Government to own the land and let it to the occupiers

65,412. For Government to own the land?—Yes. If Government could advance money to the amount of a conservative valuation of the holding, it would be a good thing. It makes the land easier to transfer.

65,413. I do not quite connect the two suggestions, the one for a system of loans and the other the suggestion that Government would do well to own the land?—I think the more easy it is for the tenant to get capital, the better, and the less money he sinks in his holding the better. Therefore, I think that the holding that pays rent is better than the holding which does not, because it is much more easy to

transfer; it makes it much more fluid. I think that Government should advance as much money as possible in that way; it would give the tenant capital.

65,414. You are dealing, in the main, with the permanently settled areas?—Yes.

65,415. And your cultivator would be the borrower?—The cultivator or the landlord; it would be so much the better if one can get the landlord's interest.

65,416. Are you thinking there of permanent improvements which might be financed on a long term basis, or season to season cultivation?—Only permanent improvements. The permanent assets would be security for such an advance.

65,417. To what use is the money to be put?—Simply to make it easier for the tenant to get capital.

65,418. In the first instance there would be the paying off of encumbrances?—Yes. Very much as under the Irish Land Purchase Act.

65,419. Have you worked out a definite scheme for the application of this principle to any permanently settled tract in India?—No.

65,420. Has there been any attempt to analyse the state of debt amongst the cultivators in the Province?—Not that I know of.

65,421. Is most of the short term season to season money borrowed on personal security only?—I cannot tell you that at all.

65,422. I should like to understand exactly what you mean on page 59 where, in answer to Question 6 (*b*), you give us some suggestions as to how to finance agricultural improvement. Let us take a concrete case. You have your normal services running, police, sanitation, roads, and so on, and they must continue; they are the normal group of subjects of expenditure in the provincial budget, and they are financed from revenue as the result of taxation. Then, let us assume that you come to a stage where you make up your mind that an important and costly canal ought to be constructed. I do not quite follow how you propose to finance its construction?—My idea was that Government should take steps to increase revenue very much in any case, and then finance everything out of revenue as far as possible.

65,423. It is simply a proposal for increased taxation in order that all improvements may be paid for out of revenue?—Yes.

65,424. So that, in the years when large works of a capital nature were being constructed, would you raise your revenue by a sudden increase in taxation?—I would not be pedantic about it. I think the rate of interest ought to be progressively decreased. I think that ought to be the main object of Government policy.

65,425. I am afraid that does not quite meet the difficulty which I am presenting to you. You are going to finance your capital works out of revenue. Then you are going to be faced either with the prospect of having enormous surpluses in years when you are not spending on capital works, or, on the other hand, you are going to be faced with the necessity for a steep rise in your taxation at the moment when you wish to build your canal or railway, and a subsequent reduction of the rise?—I quite admit that. Unless the expenditure on Government works of development was very large, that would be so. Of course, the money would have to be raised by borrowing, but the rate of interest should be progressively decreased.

65,426. Do you think this proposal is applicable in particular to India, or is it a suggestion of general value?—I think it is of general value, but that it is applicable in particular to India.

65,427. In answer to Question 8 (*a*), you say "There are innumerable opportunities for the adoption of petty irrigation schemes by the making of contour embankments". Would you like to see a special officer detailed for that work?—I think there would have to be special overseers under the Deputy Director.

65,428. A whole time overseer on that particular task?—Yes. I have asked for such a man in Chota Nagpur. I think Government are going to sanction a surveyor and a couple of men under him. I think the work will have to be under the Deputy Director; it is rather a local thing. There is not enough work, for instance, for an officer in the Provincial Service at present. Later on there may be but it will be part of the duty of the Deputy Director. He can have two or three assistants, and one of them would be employed chiefly with this kind of work.

65,429. No doubt the responsibility would remain where it is, but the virtue of having a special officer for part of the year even, if there is not sufficient work for all the twelve months, is that his whole interest and to some extent his reputation depends upon his making a success in that particular field; whereas if he were to be in charge of both this and the much more important work of attending to large scale canals, he is much more likely to attend to the more important side of his work than to the minor side?—We do not want an engineer. It is a matter of experience in this particular thing. It is done by eye mostly and then the scheme is surveyed by a fairly cheap agency afterwards. It is chiefly a matter of selecting the sites.

65,430. Local tradition in the matter of the construction of these minor works may be very good in the Province, but you do not think that an engineer who has applied his mind to, and perhaps been specially trained for, this class of work, can make a very useful contribution to the cultivators' knowledge?—Yes, but it would be expensive. There are a large number of these very petty schemes.

65,431. In the aggregate that would make a great contribution to the prosperity of the cultivator?—Yes. The man would be chiefly employed in doing a lot of petty work; not much engineering skill would be required; it is very simple.

65,432. Have landlords and the cultivating classes shown any enterprise in the matter of minor irrigation in the past few years?—No, not as far as I know. Government have carried out some schemes. The tenants are very keen when they see these schemes, and they come and ask us to help them.

65,433. Would you be surprised to learn that, of recent years, there has been an increase in the area irrigated by private canals?—I did not know that.

65,434. In answer to Question 10 (*a*) it is stated: "There is a prejudice against the use of bones" for the purpose of manure. Is that prejudice very strong in this Province?—I have not had much experience of that. This again is part of the Agricultural Chemist's evidence. There is undoubtedly a prejudice and you cannot break it down. But in Chota Nagpur where bones are chiefly of use, I do not think there is any prejudice, that is, among the aboriginals.

65,435. In answer to Question 10 (*d*), you say: "In recent years the use of ammonium sulphate for sugarcane and for vegetables like potato and onion has increased". You also add: "ammonium phosphate seems to be good for paddy and attempts are being made to introduce it". Have you any knowledge of the experiments which have been carried out in Burma on that particular problem?—No.

65,436. Do you not think it unfortunate that under existing conditions the results of the experiments carried out in one Province should not be available to other Provinces?—I think it is, but one has not the time to read up everything. Only the other day I came across something referring to experiments with ammonium sulphate in Bombay, which I had not seen before. I wrote for a copy of the leaflet and read it but unless one's attention is drawn to these things one does not always see them.

65,437. In answer to Question 11 (*b*), Babu Bhutnath Sarkar says: "For the uplands of Chota Nagpur I would suggest groundnuts and soybeans. They can also be used as revenue crops provided there is a market for them". Would you tell us if there is a market for them?—There is no trouble about groundnuts. There is plenty of market for them. For soybeans, there is no market at all.

65,438. You give us no answer to Question 14, which deals with agricultural implements. Have you been able in this Province to make any contribution towards the cultivators' needs in that direction?—Not hitherto, but Mr. Cliff, Deputy Director in North-West Bihar, has produced two or three implements which will be very useful. He has written articles in the Agricultural Journal during the last six months. He has been adapting the Punjab plough and spring-tined cultivator to pole draught. Messrs. Arthur Butler have also produced a small ridging plough which is very useful.

65,439. What is the cost of the indigenous plough?—I think from Rs. 2-8 to Rs. 5 or something of that kind.

65,440. Has it ever occurred to you that the principle of mass production may be applied to implements manufactured in wood with as great success as they are applied to the manufacture of steel implements?—I should think that the freight would be too great in comparison with the cost.

65,441. The cutting out of shapes on a large scale can be done with surprising cheapness under factory conditions and with power-driven machinery?—I should think so but the distribution would be very difficult.

65,442. Do you wish to say anything about the relation between the Veterinary Department and your own?—No. There is really nothing in common between them. We apply to the Veterinary Department for advice. They have more in common with the Medical Department than with us.

65,443. Do you agree with the present arrangement under which responsibility is divided under two distinct heads?—Yes, entirely.

65,444. In answer to Question 18 (*c*), you say: "Where, as in some parts of South Bihar, land has gone out of cultivation because of the intractable nature of the soil nothing but demonstration of profitable methods of cultivation is likely to attract labour". Have you got any information of areas of land, now out of cultivation, which could be developed?—Yes. Round about Gaya, where wages are high (about eight annas a day). There is a good deal of sticky black soil which is no longer cultivated. It is too hard to cultivate in dry weather and too sticky in the rainy season.

65,445. Are you satisfied with the degree of co-operation between your own and the Forestry Department so far as the agricultural interests of the Province are concerned?—The question has not arisen. We have a coconut farm at Puri near the Forestry Department's casuarina plantation. We had no difficulty in getting necessary help from the Forest Department.

Mr. A. C. Dobbs.

65,446. Does the practice of collecting leaves for the purpose of manure obtain in this Province?—I do not think it does.

65,447. Is grazing in the forests a question of some difficulty, between the demands of cultivators on the one hand and the requirements of forestry on the other?—I believe it is. When I was touring with the Cattle Committee, a large number of cultivators came and complained that the forests have been closed and they wanted us to do something. In Orissa, it is a rather knotty question.

65,448. We find that you have not dealt with marketing in your evidence. Has there been any attempt to survey marketing conditions in the Province?—Not as far as I know.

65,449. Do you regard it as very important, in the cultivators' interest, that markets and marketing practices should be as well regulated and as sound as possible?—Yes. We have some difficulty with the question of ammonium phosphate. It will be exceedingly difficult to get that distributed except through the ordinary *mahajans* and grain dealers. I have recently asked Deputy Directors to make demonstrations, whenever possible, on land which *mahajans* have let on the half share system. I think it would be a very good thing if Government could get into touch with the *mahajans* and see what could be done to organise marketing.

65,450. Are there any open and controlled markets where practices are regulated?—There must be. I am afraid I know nothing about it.

65,451. You know nothing about the marketing of agricultural produce in the Province? Is that so?—Yes.

65,452. In answer to Question 22 (*b*), referring to co-operative societies, it is stated: "The result is that the condition of the members of a co-operative society is daily going from bad to worse. The cheap loan encourages them to take more money than they really want and the bank authorities allow the maximum amount possible to the members for fear of keeping the money idle in the bank". Could you tell us what the banking authorities have to do with the advance to the member of a primary society of the loan for which he has applied? Do you understand the working of the co-operative machine?—I understand that the banks advance the money. I do not know the details. I have not much acquaintance with their practical working.

65,453. Is it your impression that the co-operative movement has attained, at any rate in part, the object for which it was devised in this Province?—In some parts it has, for instance, in Orissa. I understand it is much better there than in Bihar.

65,454 Have you any views as to why the co-operative movement has been less successful in certain areas than in others?—I think in Orissa you find the people taking a more intelligent interest than in Bihar.

65,455. It is a matter of the rural population being different: of the mentality of the people being more suitable for co-operative organisation in one district than in another?—Yes.

65,456. *Professor Gangulee*: Do you mean to say that the people in Orissa are more intelligent than in Bihar?—As far as my department is concerned, I find that they are, on the whole.

65,457. *Sir Thomas Middleton*: You did not seem to take a very hopeful view of the prospects before agricultural colleges in your earlier career. Have your views altered as your experience in India has lengthened?—Well, I should say that if the subjects taught at an

agricultural college were rather differently chosen they would be quite useful.

65,458. What subjects, for example, would you suggest in place of those at present included in the curriculum?—Subjects like crops, dealing with every crop singly, seeing under what conditions it flourishes; then, plant diseases, crop improvement, soil improvement, cultivation, manuring, et cetera; drainage and irrigation; crop disposal, harvesting and so on; animal feeding and management; farm management and accounts; dairying, fruit, and vegetables, poultry and such like subjects, instead of elementary sciences.

65,459. That list of subjects sounds to me very much like the syllabus for an ordinary course in agriculture, such as they have at Lyallpur in the Punjab. Your point, I take it, is that there is no object in giving preliminary scientific training, but that the students should at once take up the practical side of the subject?—Yes, that is so. At whatever stage we get them, I do not think it is any use teaching them science.

65,460. Do you mean that it is no use teaching them science in the agricultural college, or do you mean that before coming up to the agricultural college they ought to have received their science training in some intermediate college?—Yes, if possible; but if they have not got that training I do not think it is any use trying to teach them science in the agricultural college.

65,461. There is a difference between attempting to give a course of training which is purely practical, in an agricultural college, to pupils who have had no preliminary training, and attempting to do so to pupils who have been trained in science in some other institution. I am not quite clear in my mind as to which of the courses you favour, whether you favour taking a matriculate who has had no science training and giving him at once a technical course in agriculture, or whether you are advocating preliminary training at intermediate science colleges, thus restricting the work of the agricultural college to technical training?—I do not think it is any use trying to teach the matriculate any theory at all. I should simply tell him that he must take to practical work and would turn him on to the farm for training on the farm. For the type of education I suggest, I should only take in Bachelors of Science or other post-graduate students.

65,462. You would not even accept the student who had passed the Intermediate Science examination?—Not in this country; at any rate not so far as Bihar is concerned.

65,463. For the training of your departmental staff you do take science graduates and give them two years on one of your own farms. What sort of training do they get on the farm?—They are put in as farm managers and trained by the Deputy Director who is responsible for the work. This officer is supposed to coach them all the time they are on the farm. It is rather a hard job for the Deputy Director.

65,464. They are supposed to read while they work on the farm?—It is rather difficult to get books for them to read on the farm, but the Deputy Director is always coaching them.

65,465. Does the Deputy Director give anything in the way of systematic lectures?—No, I do not think so.

65,466. The pupils walk round the farm and the Deputy Director talks to them?—They are responsible for carrying on the work of the farm; but the Deputy Director is constantly criticising their work and helping them in every way. He does all he can for them. There is a Deputy Director as well as an Assistant Director on each central farm.

65,467. You gave us two reasons for the failure of Sabour. The first reason was that the students in this Province were very weak in their knowledge of English, and the other that the Sabour College was not affiliated to the University. To which of these do you attach the greater importance?—As far as doing students any good is concerned, the chief difficulty was the question of their deficiency in English. As far as the non-success of the college is concerned, that was due to its not being affiliated. Very few Biharis went to the College; almost the whole of them were Bengalis.

65,468. Do you not think that if the college had been affiliated to the University you would have found, within the Province itself, a sufficient number of students to come forward well qualified in English and otherwise?—That is true, but we could not have taught them anything much to make them useful; in fact the men who have come out from the college are not of much use to us.

65,469. We have found in other Provinces that the men trained in colleges such as Sabour, have become very useful members of the Agricultural Department, and I wonder what the difference is in Bihar and Orissa, why does a type of man who turns out a useful man in other Provinces not turn out useful in Bihar?—I think it is the elementary education, particularly the knowledge of English gained, that is the cause of it. In Bombay, for instance, I understand a large number of the people have a pretty good idea of English before they go to school at all. I think really that it is a matter of education. The English of our students is very poor indeed.

65,470. In answer to Question 1 (*a*), you refer to groups of specialists who cannot be effectively controlled by one man. What type of control do you visualise there?—That is chiefly a matter of the amount of work done. For instance, in connection with the soil surveys, the analyses have cost a great deal of money, and I am rather doubtful whether Government will get value for its money, unless or until the Director himself is an expert in chemistry, particularly now that the service is being provincialised.

65,471. It is not so much control, as the correct valuation of the quality of the work, that you have in mind?—Yes.

65,472. So far as that is concerned, if the head of the department happened to be a botanist, he would be just in the same position as an agriculturist; he would not be able to express an opinion on soil analysis?—Yes.

65,473. On the same page you recommend that co-operation in research between an agriculturist and a chemist should be organised on the basis of free and unfettered discussion. That, I take it, you would apply to co-operation in research between scientific men generally?—Yes; I do not think that co-ordination can be forced in any way.

65,474. What I want to get at is your conception of "control" in connection with scientific work?—Talking to the man is practically all one can do, I think.

65,475. You suggested somewhere else that there should be men with the prestige and knowledge of Fellows of the Royal Society engaged in supervising this work?—Yes, when a man comes out from England he really knows nothing about agriculture at all. He has not been trained in agricultural investigations. For instance, all this biological work and statistical work is work about which I myself know very little, and we discuss this as best we can, in addition to which there is a good deal of correspondence.

65,476. Would a Fellow of the Royal Society be in any better position than an ordinary administrator if he were not dealing with his own subject?—No, but I thought you might have several of them. For instance there is a Director of Statistics, I believe, up at Simla. If you had a really good plant breeder who thoroughly understood all the statistical work, he could correspond in this connection. I think if you had a University which trained the men and subsequently corresponded with them, and which could be brought into all Government investigations by specialists being co-opted, as on the Cotton Committee, you would be able to obtain very good control, because in that case the University Professors would control the scientific work in the Agricultural Department.

65,477. Your view, I take it, is that the Indian Universities have not sufficiently concerned themselves with the applied sciences as bearing on agriculture?—Yes, that is so; in the whole of India I do not think that we have got anything like all the Professors that we want, and again one has not got them all in one place where one can consult them without any trouble.

65,478. On page 58 of your note you say: "Government should, in my opinion, freely advance money to those who have occupancy rights, up to the amount of a conservative valuation of their holdings or any part of their holdings, for purposes of a first charge." What would be a conservative valuation in this Province?—I am afraid I cannot tell you definitely, because it varies a good deal. Land is sometimes worth Rs. 1,000 an acre when we acquire it. I suppose a third of that sum would be a conservative valuation.

65,479. What is the ordinary rental value of land in the Province? Is it not something like fifty per cent of the gross produce?—That is when it is not in permanent occupation. Supposing a moneylender advances money to a man on his land and takes his holding in exchange for the debt, he will then very often let it to him at fifty per cent of the produce. A great deal of land is held on these terms.

65,480. Does that not indicate that the rental value is something like fifty per cent of the produce?—Yes, it does; in the case of a very large population who have no land and cannot get labour anywhere, they will pay anything for land.

65,481. You are instancing the success of the Irish Land Purchase Acts. What would be the relation of rent to gross produce in the case of Irish village land?—It would not be more than one-sixth at most.

65,482. It would not be more than fifteen to twenty per cent?—No.

65,483. The success of the Irish Land Purchase Acts was due to the fact that rent did represent a small proportion of the gross value of the produce?—Yes, but the half share system is not really rent at all. The ordinary rent fixed by the Settlement Department is something like two or three rupees per acre I think, and that is the sort of rent that one would buy or advance money on.

65,484. If Government did not own the land, could the Government buy the land on the basis of land revenues, that is at, say, twenty times the land revenue?—They would not advance any more than twenty-five years' purchase of the land revenue or the rent paid to the landlord.

65,485. *Sir Henry Lawrence*: Would they be able to get the land on those terms?—No, but they would get a mortgage.

65,486. *Sir Thomas Middleton*: On page 63 of your evidence you point out: "In this respect the best European milking breeds are a century ahead of Indian breeds", and you suggest crossbreeding with Holstein

bulls, to be followed up by a serious attempt to graft the capacity of that breed for turning food to good account on to Indian stocks. Supposing you did raise bulls with the capacity for milk production of Holstein bulls and turned them out into an ordinary village, what would the result be?—They would be starved.

65,487. What would happen to the calves?—I should put them up for sale; I would not turn them out at all. Some people, especially where education has spread and the value of good stock is known, would buy them. The planters in Bihar would buy good stock.

65,488. Then your suggestion refers only to the very limited number of cattle owners who do pay attention to breeding?—Certainly. There would be no general improvement immediately; you would have to begin with intelligent people who take an interest in agriculture.

65,489. Do the cultivators of the Province as a general rule pay any attention to the feeding of their cows?—In some parts they do.

65,490. In which parts?—Particularly in parts of North Bihar, and in Shahabad, for instance, west of Patna.

65,491. You have a very large export trade in cattle; where are those cattle bred?—I think they are chiefly raised in North Bihar, where there are large grazing areas, which are flooded in the monsoon.

65,492. How are the herds treated in the hot weather?—I believe they are driven into the grazing areas.

65,493. Do the cattle belong to ordinary cultivators, or are they in the hands of Nepali herdsmen?—I cannot say. There are large herds in the hands of herdsmen which go beyond the borders to Nepal. There are also certain people in the Darbhanga district who buy calves and stall-feed them.

65,494. Is that quite a common thing in that part of the country?—I have no experience of it myself; I am simply talking on hearsay.

65,495. *Mr. Calvert*: Have you any suggestions to make as to how private and semi-private organisations such as your Lac Association or the Indian Tea Association could be brought into an All-India organisation for improving agriculture in general?—I suppose their members might be made members of the Board of Agriculture; I cannot suggest anything else.

65,496. Do you think there would be any difficulty in getting these associations to come inside an officially run scheme?—I think if Government offers help, you can always get an association to come in. I do not know whether the Lac Association gets help from Government. I think that such organisations would accept an invitation to attend the meetings of the Board of Agriculture.

65,497. Do you mean financial help or help with staff?—Chiefly staff.

65,498. You mean lending research workers?—When they employ research workers they expect Government to bear part of the cost. If it is merely a matter of Government recommending men, I think they would rather get men themselves and not have Government servants.

65,499. Is the Lac Association in close touch with you?—I am not on their board. I think Mr. Henderson is.

65,500. It works entirely independently of your department?—Yes; entirely independently.

65,501. *Dr. Hyder*: You were Principal of the Punjab Agricultural College?—Yes, when it was being built, not when it was working.

65,502. You did not like the kind of work, and you wanted a transfer?—I did not, as a matter of fact, draw my Principal's allowance, because I told Government that I did not think the college likely to be of much use.

65,503. We are told that the Sabour College was abolished; was that on your advice?—No; as a result of the Legislative Council refusing funds for the development of the department, a committee was appointed to consider the policy and that committee recommended the abolition.

65,504. You recruit men for your department, do you not?—Yes.

65,505. Where do they receive their training? You refer to men with science degrees; what do you mean by a science degree? A degree in physics and chemistry?—And botany.

65,506. Does that combination exist in those universities from which you draw your recruits?—Yes. I imagine that a man who takes botany takes only elementary chemistry.

65,507. The man must know English and must have two of these three subjects, physics, chemistry and botany for his B.Sc. degree; which of these do they take?—I cannot tell you.

65,508. Let us discuss the case of a student who has only two subjects, physics and chemistry. You say he is going to be recruited for the Agricultural Department and put straight on to the farm. He knows nothing about botany. Where would you give the man his training in botany?—As a rule, we try to get men who know something about botany; but if we get a man who does not know botany we simply put him on to growing crops and selecting and testing varieties; we give him as much work as possible of that nature.

65,509. You think a graduate in science, who has no knowledge of botany whatever, would be able to grow crops and carry on the investigations to which you refer?—Yes. The class of work to which I refer he could do; we can get a man to distinguish between a healthy plant and an unhealthy plant. It does not necessarily follow that a man who knows botany knows anything about agriculture at all.

65,510. That is the difficulty. Supposing a man takes his degree in physics and chemistry it does not necessarily follow that the knows agriculture. So, you require an institution where you can combine theoretical training with practical agriculture?—It would certainly be of help to us.

65,511. Are you in favour of the re-establishment of such a college here?—No. I do not think it would be worth while; we should only get two or three men at a time who would require an education of that kind. I would rather have a central institution where we could send them for a post-graduate course.

65,512. That would be for fundamental research work?—It would be for general training in agriculture, things like farm management and accounts, dairying, cattle management and feeding, also field experiments.

65,513. Do you think the members of your department in the subordinate ranks and also in the Provincial Agricultural Service can become competent officers and discharge their duties by being put on to a farm under an officer who has himself not received any such training?—No; we do want good men as Deputy Directors to train these men. The best Deputy Directors should train them.

65,514. Have you interested yourself in the history of the Lyallpur College? -Is it flourishing?—I believe it is doing very well.

65,515. Would you like to have such an institution here? You say that the number of recruits you require is too small?—It would be a great waste of money.

65,516. The population of your Province is about thirty-one millions?—I think so.

65,517. What is the population of the Punjab? It is certainly less than twenty millions?—Yes?

65,518. What is the cultivable area in Bihar and Orissa?—It is 111,000 square miles.

65,519. Just compare the Punjab and Bihar and Orissa in regard to population and the extent of cultivable area. The population of the Punjab is smaller and the cultivable area in the Punjab is just about the same as in Bihar and Orissa. Yet you feel that you cannot have a college here, because of the lack of education in English?—Partly for that reason and partly on account of the fact that the college was not affiliated to the University. I do not know how many students from the Punjab college have gone back to the land.

65,520. What about men purely for departmental purposes?—The men who came out from the college have not been more useful than the men who have not.

65,521. Is that your experience?—Yes. We get a wider choice if we do not put them through the college. You narrow the bottle neck by putting them through the college.

65,522. You say in your note of evidence that many schemes of permanent improvements cannot be carried out, because of the attitude of the landlords and because of the existence of many laws. Apart from the attitude of the landlords and such other matters, what are these laws to which you are referring?—The fixing of cash rents, the laws of inheritance and the permanent settlement.

65,523. If a landlord has got an estate and he requires to bring that estate under irrigation by *bunding* or some other scheme, surely there is nothing to prevent him from carrying out that scheme, and there is nothing in the Bengal Tenancy Act to prevent him from doing so either?—Perhaps not. I think that the fixing of rents on the cash basis does discourage landlords from going in for improvements.

65,524. That would apply to lands permanently settled, and even in regard to such lands the landlord can, by registering the improvement, apply to the court and have the rent enhanced according to certain rules?—Yes. I suppose it is, fundamentally, want of education. The landlords, the smaller ones particularly, do not as a rule take very much interest in their land. Some of the bigger landlords are good landlords. With the smaller landlords, fundamentally, I suppose, it is want of education.

65,525. As regards the financing, I am not sure whether I understand the steps. But apart from the scheme which you have outlined, I ask you whether you are in favour of a policy of indefinite extension of rural development, no matter what the cost to the State?—No. I do not think there should be uneconomic development. I do not think it is safe or wise.

65,526. You are aware that in any scheme the State will have to take into account the return, direct and indirect, and correlate such a return to the cost of borrowing?—Yes. I think that covers the

whole thing. That is why I am anxious to see the rates of interest reduced. Government is very largely tied hand and foot by having to pay a high rate of interest, and a scheme must bring in a very big return to make it worth going in for at all.

65,527. *Babu A. P. Varma*: Can you suggest any subsidiary industry which can be profitably taken up by the agriculturist in general, without involving much of capital?—I am afraid I cannot.

65,528. Do you think spinning and weaving can be of such help to the agriculturist in general?—In so far as it pays, I suppose it is. I do not know anything about it.

65,529. Is sugarcane cultivation extending?—It was extending a few years ago when prices were high, but I do not think it is extending now.

65,530. The area under sugarcane cultivation is decreasing; can you give any reason why?—I do not think it is, appreciably. I think it has decreased a little in the last year or so, because the price of *gur* particularly has been very much lower for the last year or so.

65,531. Is there any prospect of its going up again?—Yes; if prices rose, it would.

65,532. *The Raja of Parlakimedi*: In connection with your remarks on the first page of your note on rural development, is there any scheme before Government at present?—Not that I know of.

65,533. You have not made any suggestions?—The Chairman has kindly given me leave to put in a formal note on the subject.

65,534. Do you know of any district boards or other local bodies which take any interest in it?—No, I do not think they do. There are development boards created by Government in the different divisions, consisting of the Deputy Director of Agriculture, the Assistant Registrar of Co-operative Societies, a representative of the Veterinary Department and a few local people, and they consider any kind of scheme for improving agriculture. There is a District Agricultural Association in Sambalpur, which has done a good deal of work. Outside Sambalpur, there is no spontaneous improvement of things at all.

65,535. On page 49, on the subject of organisation, you make certain suggestions. Have you forwarded your views to the Government? You say "In my experience the great mass of precise investigations undertaken for the benefit of the agriculturist in Bihar and Orissa must be conducted on farms in the localities". Have you forwarded any schemes to Government?—Yes. I am always forwarding schemes to Government.

65,536. How are they being received?—They are generally considered. They have to go before the Standing Committee of the Legislative Council. They take some explanation before they go through.

65,537. Are they fairly well received?—Yes, on the whole. It is difficult to get enough highly paid men from the Legislative Council. They are, on the whole, against spending money on highly paid staff unless they see a pretty certain return for it.

65,538. By how much would you have it increased?—I have put forward a proposal for doubling the number of Provincial Service officers in the Agricultural Department. That proposal will be considered, I hope, in the next six months.

65,539. How long has it been before them?—About four months.

65,540. You are sure that they will view it with sympathy?—That I cannot tell you. Probably they will. Probably the Legislative

Council will be quite ready to agree to the appointment of ten more men in the Provincial Service.

65,541. They will be spread throughout the Province?—Yes. It will be more difficult to get additional big farms.

65,542. How would you distribute them?—We have now six circles in charge of four Deputy Directors and six Assistant Directors. I have suggested that there should be seven circles and that there should be a Deputy Director and two Assistant Directors in each.

65,543. As regards demonstration work, how would you have it conducted?—The Agricultural Committee in 1921 recommended that sixty-four farms should be created, one in each sub-division, in charge of an overseer, who would start on Rs. 35 and whose maximum pay would be Rs. 150; demonstration work would be based on the sub-divisional farms, which would grow seed and make experiments. The farm would be the headquarters of the overseer who would be in charge of demonstrations. I think that is quite sound.

65,544. What extra expenditure would be involved in having these extra farms?—The scheme of sub-divisional farms has been approved already. It is being put through by degrees, as we have the men trained for the work. It means about Rs. 5,000 a year for each farm. There will be sixty-four farms; there are now about eighteen.

65,545. They would tackle the important crops of those localities?—Yes, they are doing it already. The whole sugarcane crop on three farms has this year been sold to people in the neighbourhood for seed.

65,546. The people are adopting improved methods?—They are adopting them to a great extent in the neighbourhood of some of the small farms.

65,547. On page 54, it is said that people who take to agriculture are looked down upon?—That is Babu Bhutnath Sarkar's evidence; I have no doubt but that it is true, amongst middle class people who are not ryots themselves.

65,548. Do you mean that people who carry out their operations efficiently and really prove successful cultivators are looked down upon?—I imagine it is really a case of doing manual work, and going out in the rain and sun. I think that is what Babu Bhutnath Sarkar means when he says that they are looked down upon. I do not think they look down on a man who merely manages a farm.

65,549. Do you mean that they are looked down upon when they actually handle the implements and do the rough part of the work? If they merely supervise and carry on farming efficiently, they may not be looked down upon?—They must be ready to turn their hand to things, for instance the adjusting of machines and things of that sort, if they want to be successful.

65,550. But that will not lower their position in society?—I think it is chiefly a matter of prejudice against the doing of this kind of work, because it involves a certain amount of exposure, and so on.

65,551. Does the same sort of thing still exist?—Very much, I think, in Bihar.

65,552. There is no improvement?—I cannot say. My experience is not sufficient. I do not know much about these things myself. I cannot talk the language as well as I ought to be able to.

65,553. You mention that in a certain farm the soil was effectively improved. Was that experiment made known to the people?—

Yes. We are doing a certain amount of demonstration on the basis of that. We are also getting the cultivators to cultivate sugarcane on paddy land. The people in Chota Nagpur do not take very readily to improvements. They are satisfied with rice as a rule.

65,554. You complain about the pilfering that goes on during the transport of agricultural produce. Have you had that brought to the notice of the railway authorities?—I mentioned it to the Station-master in this particular instance. He said that it was difficult to stop or words to that effect. An occasional protest of that kind is of no use. One has to keep on at it continually.

65,555. You have not subsequently had occasion to find out whether the same practice goes on?—The same thing goes on always. For instance, people take coal out of trucks.

65,556. Do the people in this Province apply farmyard manure freely?—Most of the farmyard manure is burnt, but they apply what they can spare.

65,557. They grow fairly good crops?—In some parts, yes; not everywhere. The greater part of the paddy land is very poor.

65,558. They are not taking to any of the manures suggested by the department?—On the contrary, some of them are buying ammonium phosphate. One man bought Rs. 400 worth this year. We tried the experiment last year but our department is not big enough to sell manures on an extensive scale.

65,559. Do no other agencies take it up?—The co-operative societies try to take it up but their organisation is hardly businesslike. Unless some intelligent outsider takes a particular interest in it, it is difficult to get it done effectively.

65,560. Is the application of green manures known to the ryot?—It is very difficult to make it pay. When you have grown green manure it does not always prove effective and, particularly in South Bihar, it is not always possible to get the crop to grow.

65,561. But they could make use of the leaves of evergreen plants?—I think they do all they can. They generally feed the cattle with these.

65,562. What about cattle breeding in this Province? Are any people taking it up on a commercial scale?—There is no prospect of doing it on a commercial scale. The cattle cost more to rear than they are worth.

65,563. *Sir James MacKenna*: Under the present method of recruitment for the Agricultural Department in this Province, do you get only residents in the Province on your staff?—We give preference to the men in the Province. We only advertise in the Province.

65,564. How does it actually work out?—Three appointments have been given to men in the Province. In fact we have not advertised outside the Province. The idea is to appoint men as Assistant Directors who would later on become Deputy Directors.

65,565. Your Deputy Directors will join after their I.Sc. and get practical training on the farms?—The B.Sc. Honours is our limit. We insist on B.Sc. with Honours. That is the essential point on which we lay considerable importance.

65,566. Assuming that an agricultural college were again started in this Province, what do you think would be the most suitable site for it: Sabour?—No, that part of the country is not really representative of any part of Bihar except itself and the small strip along the Ganges.

65,567. Have you formed any idea as to what would be a suitable site for a college, assuming one were started?—It depends on what is taught at the college. If you teach only elementary science, it does not matter where it is. For the sake of the Professors, perhaps Patna would be the best place.

65,568. Without an agricultural college in Bengal, Bihar and Orissa, and Assam, do you consider the present position to be satisfactory, generally?—I think there ought to be some place where we could send the men but it would not be worth while starting a college for a few men. Personally, I would rather have a better scientific education and not trouble about agricultural education. If a man comes to us with sufficient scientific education we can teach him on the farms. I think their general education should be as good as possible. I do not consider it desirable that a man should waste his time in an agricultural college when he is fairly young.

65,569. Have you formed any idea as to how Pusa could be made a more vital force in the agricultural economy of India?—I think if we had really good men and a larger staff of biological chemists, statisticians and agronomist, et cetera, it would be much better.

65,570. Would you emphasise the research side?—I should emphasise the research side chiefly.

65,571. I suppose you have been following the evidence given before this Commission and have read of the numerous suggestions for some centralised organisation?—I am afraid I have read very little.

65,572. *Professor Gangulee*: In answer to some of our questions you have submitted the views expressed by some of your subordinate staff. Are we to understand that you are in agreement with such views?—Where I am definitely in disagreement I have said so.

65,573. Referring to the question of agricultural education you have quoted your Assistant Professor of Chemistry who says that if the Sabour College had been affiliated to the University and had trained the students for a degree, men of the requisite standard would have been forthcoming. Do you agree with that?—I think we should have got intelligent men in larger numbers. We should have had a wider choice.

65,574. In the Committee which decided to close Sabour, who signed the majority report?—I think we all signed the main report.

65,575. But you had a note of dissent?—Yes. All the officials signed the note of dissent.

65,576. I know that. In the main report they wanted to close down Sabour and also the research activities of Sabour?—Yes.

65,577. In your note of dissent you agreed to the closing of Sabour as an institution for teaching but did not agree to close the scientific section. Is that right?—Yes.

65,578. Your view is that teaching and research should be divorced?—Our view was that we could not get men here worth teaching.

65,579. That was in the year 1921, was it not?—Yes.

65,580. Since then we have a University here. Do you know whether this University has a Faculty of Science?—I suppose it has. I know very little about it.

65,581. There is a Faculty of Science of which Dr. Caldwell is the Dean. He is an eminent chemist and from the Third Quinquennial Report on the Progress of Education I find that scientific education in

this University is making good progress. For instance in the I.Sc. examination, since 1923, 1,037 students appeared and 533 students passed; in the B.Sc., since 1923, 227 students appeared and 128 passed; and, in the M.Sc., 27 students appeared and 15 passed. Would you consider that we have now abundant material on which scientific agricultural education may be based?—I do not suppose they would come to an agricultural college.

65,582. This material did not exist at the time you closed down Sabour?—I imagine we got people from the Calcutta University. I do not know whether there has been any great improvement in the science teaching of the Patna University.

65,583. I have just quoted to you the number of students who have had a preliminary scientific training. That shows a certain amount of development. In view of that development would you like to reconsider the question of re-opening the college?—We did not get the people who passed the I.Sc., and the B.Sc.

65,584. At that time?—Yes. I do not know whether you would get more now if the college were affiliated.

65,585. You have a College of Engineering here, which is affiliated to the University. Is it working well?—There is a big demand for people in the Public Works Department.

65,586. There is a Medical College. Both these institutions are affiliated to the University of Patna?—Yes.

65,587. You stated that you take the B.Sc. Honours graduate and train him. I am afraid I have not understood your method of training?—As a rule the man is put in charge of a big farm at the headquarters of a Deputy and Assistant Director and he runs the farm. He makes experiments and the Deputy Director coaches him. The Deputy Director, when he is not on tour, goes round the farm constantly and trains these men. He lives on the farm itself.

65,588. These B.Sc. students have some knowledge of the fundamental sciences, namely physics, chemistry, and so on. Would you agree that agricultural chemistry and agricultural engineering and other subjects involved are really technical subjects?—Agricultural chemistry is almost entirely a matter of applied chemistry. When you take a man who has learnt chemistry for agricultural work you do not want him merely to be able to make an analysis of foodstuffs.

65,589. I quite follow you, but what I want to know is whether putting these young men on the farm under a Deputy Director would qualify them sufficiently for agriculture?—If the Deputy Director has the time and is really a good man, then I think that it would.

65,590. How many such B.Sc. students are working on your farms now?—We had one man as an Assistant Chemist. When the College was closed we turned him into an Assistant Director and sent him to Cuttack where he is doing very well. We have got another man who was a B.Sc. Honours student; he was also trained and is turning out pretty well. This man is at present working directly under me at Sabour. They learn something of statistical methods and such things. I have sent round copies of Fisher's book on statistical methods to Deputy Directors, and so on.

65,591. You do not follow any books, do you?—I read the reviews on books in 'Nature' and so on, and whenever I come across a book which I consider likely to be useful to the Deputy Directors I obtain a number of copies and distribute them.

65,592. Do you send students to Pusa?—No.

65,593. Do you send them to any neighbouring Province to see the work that is done there?—Not lately. We intend sending men for training to Bangalore or Pusa.

65,594. The point is that up till now you have not attempted to train any one of these graduates in Pusa?—No.

65,595. Turning to the Subordinate Service, may I know what salaries overseers and farm superintendents and such like people get?—Overseers who have passed the matriculation standard get Rs. 30, rising to Rs. 150; I.Sc. men start at Rs 35, and people who have had a couple of years' training at an agricultural college in any Province start on Rs 40; farm managers get from Rs. 150 to Rs. 200, with prize posts at Rs. 225 and Rs. 250. Rs. 250 is the lowest pay of the Provincial Service, but the probationary pay is Rs. 200.

65,596. These overseers and farm superintendents are trained by your superior staff?—Yes, they are trained on the central farms.

65,597. I understand from your departmental Report for the year 1925-26 that a great deal of the time of your Deputy Directors is spent in the training of these subordinate men?—Yes, that is so; in fact they would spend more time if they only had it at their disposal.

65,598. In referring to the hard work of the Deputy Directors, you say in your Report that the burden of training an endless procession of recruits for the Subordinate Service is very great?—Yes, we have only got eighteen sub-divisional farms so far, and we want to raise the number to sixty-four as quickly as possible.

65,599. Have you not been able to secure an effective staff from this endless procession of recruits?—Some of them are quite good.

65,600. Does this endless procession of recruits suggest a demand for agricultural education?—There is a demand for posts on sixty-four sub-divisional farms.

65,601. Certain items of agricultural improvement that have been effected by Pusa were mentioned by you in answer to a question from the Chairman. Could you tell us what definite improvement has been achieved by the department in Bihar and Orissa?—There is a gram which gives twenty-five per cent more yield than the local gram in a considerable part of South Bihar; it is of no use in North Bihar. There is a rice which was selected from a variety of local rice and popularised throughout the Bhagalpur division and is doing very well in the south of the Province. We have half a dozen improved varieties of rice altogether. Then there is the Coimbatore sugarcane in connection with which we have a system of draining paddy land by a very simple means, and this is doing very well indeed. Then there is sulphate of ammonia for vegetables and sugarcane; and ammo-phos for paddy.

65,602. When you say that ammo-phos is good for paddy cultivation, is that based on any definite experiment conducted?—Yes, that was tried by the Assistant Director in South Bhagalpur on two of our farms last year. On seventeen plots it gave, I think, an increase ranging from six to ten *maunds* of paddy and twenty to thirty *maunds* of straw on the average, and it gave an increase on every plot.

65,603. In connection with these experiments do you record your successes as well as your failures?—Yes, they are all recorded.

65,604. Are they available for the next officer who comes along?—Yes, they are recorded in the reports as a rule. But it is rather a mistake to condemn a thing because it has failed in one instance.

65,605. I quite follow you there, but the difficulty is that reading through these reports one does not get an idea as to the failures in experimental work?—No, because they are so numerous that they would overburden the report.

65,606. What I want to know is whether an officer of your position would have access to the material recording the failures of experiments?—As a rule these are recorded in the farm reports and filed with the records of the farm. I myself have made a good many failures. For instance I tried lucerne at Kanke and it proved a failure. But I have not forbidden my successor to try it himself, because he may be able to do it better than myself.

65,607. So that there are records containing the failures as well as the successes?—Yes.

65,608. Is there any continuity of research or experiment? You said just now that you had conducted experiments with ammo-phos. Are you still carrying that on?—Yes, we are going to try di-ammo-phos next year; this is very cheap and I have accordingly undertaken to experiment with two tons of it all over the Province. It is much cheaper than ammo-phos.

65,609. What I want to know is whether there is any continuity in research or experiment?—Yes, there is continuity. Whenever a Deputy Director changes you do get a slight change in the continuity, but on the whole it is carried on without any serious break.

65,610. Do you think that the frequent transferring of your Deputy Directors and other officers in charge of experimental stations interferes with the experimental work that is being carried on?—Certainly it would. But we do not transfer them very frequently. Government have agreed to keep a man five years on one farm when first he goes there.

65,611. The use of gypsum is very common here, is it not?—It is not very common; they have taken it up only lately.

65,612. On what type of soil do they use it?—Chiefly in Bihar generally. It is very good on groundnut in Chota Nagpur but it makes no difference in Orissa, judging from the trial we have given it.

65,613. With regard to manures I think you told us that the cultivators do not take readily to improved methods. But once they realise the improvement do they not take it up at once?—I myself have had no difficulty in that respect. If there is anything that is really an improvement, the cultivators take it up at once.

65,614. With regard to your good seed, what percentage of increase do you get with your good seed over the local variety?—It varies very much; in a dry year Dahia paddy may give double the crop; in some years it gives less. If you have plenty of rain continuing late in the season then Dahia will not give as good a crop as other paddy.

65,615. Can we take it that Dahia paddy is one of the contributions of the Agricultural Department?—Yes, as a matter of fact the same paddy is grown under a different name in considerable areas of the Province. But a pure type of this particular variety was selected and tested at Sabour and we found it much the best crop.

65,616. What organisation have you got for seed distribution?—We have little or no organisation in that respect. What we do is to arrange with the co-operative societies. We distribute seed for a quarter of an acre free, once, in every village to a selected man and then we try to get him to multiply his seed and arrange to distribute

it to other people. The distribution has in the past been done chiefly on the *sawai* system, that is to say, the seed is given out to the cultivator and, in return, twenty-five per cent more is obtained at harvest time. We have arranged with the co-operative societies to get this back and to distribute it to the other members.

65,617. You are carrying on experiments with artificial manures and you are testing varieties of crops. What are the other experiments that are being conducted in your experimental farms? What are the varieties?—We have half a dozen varieties of rice.

65,618. On this question of rice improvement, could you tell us whether you are in touch with any other stations in India?—I have got one of the most promising paddies from Assam.

65,619. Are you in touch with the neighbouring Provinces: Bengal, for instance?—Yes.

65,620. With Madras?—Not so much with Madras because they have quite different climatic conditions; but whenever our Deputy Directors see in the reports that they have done something in another Province that seems likely to be useful they ask for it.

65,621. If I remember right you have developed a technique for testing suitable varieties of crops?—Yes; it is more or less based on the system developed by Mr. Parnell in Madras, that is, to have a large number of long narrow plots.

65,622. Are you developing the technique of testing varieties?—Yes.

65,623. We are told by a responsible officer in his note of evidence that the Agricultural Service appears to him, at present, to be absolutely out of touch with the local cultivators and with the civil administration. Do you agree with that view?—Well, we have not enough men to affect very much of the Province, but our small farms are in close touch with the local cultivators. As regards the civil administration we always get help from the sub-divisional officers wherever we require it. If the department is strong enough and we have enough improvements, I do not think there will be any difficulty in getting into touch with the local cultivators.

65,624. You agree with that criticism but your explanation is that you have not enough men to get into touch with the cultivators?—We have not enough men, and we have not improvements which would be worth giving to a large number of cultivators. A great many things that suit South Bihar do not suit North Bihar, and a great majority of the crops that suit North Bihar are of no use in South Bihar. We have done much more in Orissa and South Bihar than in North Bihar.

65,625. Why could you not be in touch with the civil administration?—We are in touch; there is no difficulty at all.

65,626. You told us, in answer to a question by one of my colleagues, that sugarcane cultivation is decreasing, although not very rapidly?—I think I have told the Commission that our statistics are very poor, and it is very difficult to say whether it is increasing or decreasing. But I certainly hear that people are planting less of sugarcane because the price of *gur* is going down.

65,627. From the statement given to us by Government we find that there is a decided decrease in the area under sugarcane irrigated by the Son Canals. In 1902 the area under sugarcane was 72,348 acres; in 1924-25 it was 37,463 acres. Could you explain why there has been such a fall?—The Son Canal area is waterlogged; they grow worse cane in that area than anywhere else, because there is a great area

CX-L-3 108859

under rice and the cane is grown in the middle of rice fields which cannot be drained.

65,628. Since 1901, when the area was 72,000 acres, a great deal of land has become waterlogged?—I do not know when the canals were started, but that is possibly the reason. There is no doubt that they grow worse cane there than anywhere else.

65,629. *The Chairman*: On that, I find that there is a steep drop between 1905-06 and 1906-07, namely, from 69,739 acres to 36,009 acres; and from that time it is, broadly speaking, true to say that the acreage has never recovered. Is there anything to explain why that drop occurred in that particular year and why the acreage has not increased since?—I do not know; it may be a change in the price of *gur*, or it may be a change in the method of collecting statistics. The Irrigation Department people ought to know about these statistics.

65,630. *Professor Gangulee*: In your survey work you did not come across this tract?—No.

65,631. What is the nature of the soil survey you are taking up?—So far we have taken valleys of rivers; we traverse across large numbers of rivers and see whether there is any difference in the land, the formation of which is due to different rivers. That is the best way of classifying land.

65,632. How do you find out the deficiency in phosphates or nitrates: by analytical work?—Yes.

65,633. Have you mapped out these?—The information is published in the annual reports, with maps.

65,634. Have you got sufficient data to show which parts in Bihar and Orissa are deficient in phosphates?—Not accurately, because the the survey covers only a small area; but on the whole we know that South Bihar and some parts of North Bihar are very deficient in phosphates.

65,635. You have submitted a list of specialist research officers. Do you occasionally send these officers to Pusa?—No; we do not.

65,636. You do not think it necessary that they should be in touch with the research work at Pusa?—I do not think they can get into touch with the work there simply by going there; unless they go there with a definite object, I do not think they will get into touch with the work.

65,637. What is the work done by the Mycologist?—There is no Mycologist; he is the Economic Botanist.

65,638. He was originally the Mycologist?—Yes.

65,639. From the evidence before us, we find many witnesses saying that the *sandha* disease in rice is very severe in Chota Nagpur?—Yes.

65,640. Is there any one carrying on research work on that?—It seems to be a matter of the soil.

65,641. It is a physiological disease?—It is caused by an insect; if the soil is rich it cannot do much damage; if the soil is poor it does a great deal of damage.

65,642. Have you come to this conclusion by observation, or by experiment?—By observation.

65,643. There was no experiment to find out the incidence of this disease?—It would be very difficult to find out exactly the area covered by it.

65,644. The Economic Botanist is in charge of the plant selection work?—He is doing intensive work at the Sabour farm. The area is small, and he does the work there. There are also Deputy Directors who work on their farms, but their work is not so concentrated.

65,645. By plant selection work you mean only work on rice?—Chiefly rice, but there are other crops, soybeans for instance.

65,646. Is that an important crop?—It grows exceedingly well, but there is no market for it.

65,647. Is there any prospect for *sisal* hemp in this Province?—A gentleman in Sambalpur is, I believe, making a good deal of money out of it; he has 1,500 acres.

65,648. Is the department doing anything in that direction?—No; we refer everybody to him for information.

65,649. In a note submitted to us we find that the varieties of rice which do very well in North Bihar give a very low yield in South Bihar. What is the reason?—Probably soil conditions. There is, for instance, a large quantity of lime in North Bihar.

65,650. You say 'probably'; that opinion is not based on any experiment?—It is not based on any experiment. But we know from Mr. Howard's experiments that varieties of other crops which grow well in North Bihar do not grow well in South Bihar and *vice versa*.

65,651. Then coming to the Development Board: Could you tell us how often the Board meets?—Three or four times in the year.

65,652. What do you discuss in these meetings?—Anything of common interest, for instance, arrangements for the distribution of seeds.

65,653. Who convenes these meetings?—The Secretary.

65,654. Is there a permanent secretary attached to the Development Board?—No; he is Secretary in the Education and Development Departments.

65,655. There was a proposal to have a development cess in this Province?—I do not know of any such in this Province.

65,656. Do you find that the cultivators living very close to your best farms, say Kanke, have derived much benefit from the farming operations there?—They have taken small quantities of the paddies, but they have not taken to sugarcane cultivation.

65,657. Where is your chief sugarcane station: Sipaya?—I suppose so; most of our sugarcanes are grown on small farms in South Bihar and Orissa.

65,658. You still retain Sipaya, although the recommendation of the Agricultural Committee was that Sipaya was not suitable?—I should not say that Sipaya was not suitable; I should say that Sipaya was not representative of the eastern part of North Bihar.

65,659. You have not abandoned the Sipaya farm?—No.

65,660. Is that under you or the Sugar Bureau?—It is under the local department. We have now also two sub-divisional farms at Darbhanga and Siwan.

65,661. What, exactly, is the relationship between your department and the Sugar Bureau in regard to sugarcane cultivation in Bihar and Orissa?—Mr. Henderson and Mr. Sayer arranged that we should place four overseers under the Sugar Bureau and we are making use of the services of the Sugar Bureau in that way. We distribute a very large amount of Pusa canes among the cultivators.

65,662. There was a Cattle Committee over which Dr. Clouston presided?—Yes.

65,663. What was the recommendation of the committee?—They recommended that Sipaya should be a farm for buffalo breeding, and that dairy farms should be established at Cuttack and Patna. We are doing that. A farm has been established at Patna under the Veterinary Department, and we are establishing one at Cuttack under the Agricultural Department.

65,664. Is any cattle breeding work going on in the Province?—There are dairy farms.

65,665. What is the object you aim at in these farms? Is it to breed a dual purpose animal?—It is chiefly for milk. We are taking the local cattle in Orissa and breeding for milk.

65,666. Are you in favour of the policy of breeding for a dual purpose animal?—It is a thing which has got to be tested. I see no reason for supposing that draught breeds cannot be made to give much more milk than they do at present.

65,667. What policy will you adopt in the proposed cattle breeding farm? Will you aim at a dual purpose animal, or is your chief objective to increase the milk yield?—Chiefly milk.

65,668. Is the price of cattle increasing in this Province?—The price of bullocks has increased very much.

65,669. Why?—I think the reason possibly is the decrease of grazing grounds.

65,670. *Mr. Kamat*: On the question of the policy of agricultural education in this Province and your views about affiliation, would you be in favour of affiliation as a means of making the agricultural college a success?—No, I cannot say that I am. I think, as a test of whether you want an agricultural college or not, it will be better not to affiliate. I mean that that is certainly what showed us in this Province that an agricultural college was not wanted. That is the view the Government of Bengal took at the time. They said they were not going to have a college which was not run on this basis.

65,671. Do I take it then that supposing (now that Patna University has been constituted) some people propose to have an agricultural degree and the affiliation of the college, you would still oppose it?—Yes, unless an agricultural degree was wanted and there was a demand for it.

65,672. The committee which dealt with the Sabour College reported in 1921. Do you not think that the time has now come to reconsider the whole position of higher agricultural education?—I do not think so. It was because there was no demand that the college was a failure. If anything, we ought to have a central place where we could send a few men to be trained. As a matter of fact, after the college was closed, we had a couple of men still who had not finished their course, and we sent one to Cawnpore, and the other to Nagpur.

65,673. On page 52 of your note, you differ from your Deputy Director, Babu Manmatha Nath Ghosh, and you state: "My view is that, on the one hand, an agricultural college should be a technical institution elaborating and teaching agricultural industries such as *gur* manufacture, dairying, fruit-growing and marketing, fibre extraction, etc., and should not teach, or conduct research in, chemistry as such; and, on the other hand, that Patna University, having regard to the purely agricultural character of Bihar, should relate its whole outlook, the nature of its researches, and the material it uses for educational purposes, to agricultural interests." In other words, if at all you are in favour of an

agricultural college, the function of such a college should be, you say, to teach *gur* making, fruit preserving, fibre extraction, but not chemistry?—I do not want to tie myself down to those things. There are also subjects like farm management and accounts, animal feeding, and other things. They should be technical things, not scientific things.

65,674. You are in favour of an expansion of your department by opening more farms, and you want more Deputy Directors and Assistant Directors, and so on, and for their scientific equipment you are in favour of recruiting Bachelors of Science, and giving them practical agricultural training?—For scientific equipment, the B.Sc. with Honours should be the minimum qualification.

65,675 I gather from your replies that you would take Bachelors of Science and give them practical agricultural training?—Yes.

65,676. Would this be the material from which you would draw your Deputy Directors?—The Deputy Directors will naturally be promoted Assistant Directors.

65,677. You complain that your present Deputy Directors are overworked, because they are engaged in the main in training up their subordinate staff; and Deputy Directors, in your view, should consider it their function to train the agricultural subordinate staff of the Province. You think that that is a function of the Deputy Directors rather than of an agricultural college?—That would give no trouble after we have the whole department going. At present we have few farms, and it does give trouble now. Later on, when we have more farms, when we take two to three men every year and post them as overseers on the farms, there will be no trouble about the training; the rest of the staff will train them.

65,678. Have you considered the other alternative? Supposing you had an agricultural college, where this sort of training could be given, would not that save you an expansion of the cadre of your Deputy Directors and Assistant Directors?—No, I do not think so. The work is expanding, and by the time we have trained all our men there will be plenty more work to do.

65,679. Supposing an agricultural college relieved you of this overwork of training, you would still require the same number of Deputy Directors?—If Government relieve us of this work, which I do not think it can, it would enable us to expand more quickly. It would not do us any good when we have finished our expansion, because then the training will not trouble us at all. The training you are speaking of now is practical training in agriculture to enable them to grow crops; they could not do that in an agricultural college in any case.

65,680. In fact, you consider that in other Provinces where agricultural graduates are turned out in a college, the Deputy Directors have to devote the same amount of time to the practical training of their subordinates?—When the staff is expanding rapidly, I think they would. As a matter of fact, most Provinces started with a larger number of Deputy Directors than we did.

65,681. In your view, then, it makes no difference whatsoever if you have a ready-made agricultural graduate for your subordinate staff?—Except in so far that he does get his training under a large number of European officers who do understand their subjects very well themselves. If you concentrate a large number of highly trained men on a few students, it would certainly produce more intelligent students. I think men trained for the Agricultural Department in other Provinces may be a good deal better trained than similar men obtained through the Universities for this reason.

65,682. Taking a broad view of the position of the Department of Agriculture in this Province, the Local Government in their Administration Report for 1925-26 have given a significant *resumé* as to why the department is as it is at the present moment. They say with reference to the improvement of agriculture here "Bengal, with which the province was linked up till 1912, was one of the last to make any progress with scientific agriculture, and scarcely had the so-called second partition become a reality and plans for a new organisation been sanctioned, when the War broke out, and not only were no new experts forthcoming, but most of those already employed had sooner or later to be spared for foreign service. Then, after peace had been made, just as a few recruits had been secured, the new Legislative Council, aware that little or nothing had been accomplished after so many years, and unable to comprehend the possibilities of scientific agriculture, adopted a hostile attitude towards the department, and even managed to deprive it of some of the organisation which it possessed." In other words, you lost some experts because of this hostile attitude of the Legislative Council. Do you agree with this statement of the history of this question?—Yes.

65,683. Do you think the attitude of the Legislative Council was hostile because they did not understand the importance of research and scientific agriculture, or because they were against the then experts?—It was largely because they were against the experts at the time, and largely also, I think, because the college was staffed very largely by Bengalis. Members of the Legislative Council went down to Sabour, and the students complained that there was prejudice against the Bihari students, and that Bengali students were favoured by the Bengali Professors; that created a hostile atmosphere against the college in particular. That is very largely why they were so anxious to cut things down.

65,684. I am asking you to clear up this point in view of another paragraph in the same Administration Report, on the question of the attitude of the Legislative Council in connection with a cognate department with the Agricultural Department, namely, the Veterinary Department. Government, in their remarks about the Veterinary Department, state: "This department never suffered from the wave of unpopularity and distrust which so affected the development of agriculture. If one is to judge from the questions and resolutions tabled in the Legislative Council, its work has always been appreciated, and the local bodies in co-operation with which veterinary relief is administered are constantly demanding fresh subordinates. In its early years the department met with much resistance because of the prejudice amongst Hindus against the shedding of even a few drops of blood of the sacred animal in the process of inoculation, but this has been overcome with the assistance of the leading Pandits of the Province, who have pronounced it only not a crime but a duty to save life. Experience of the efficacy of inoculation as a means of checking the spread of epidemics and the powerful advocacy of co-operative central banks have completed the conversion of the peasantry." Now, with reference to the Veterinary Department, that is the attitude of the same Legislative Council?—Yes.

65,685. You explained that, with reference to your agricultural experts, it was purely a question of prejudice against the Bengali?—I did not say "purely." I think I said that it was largely due to that. We had not done very much; I admit that. We have been concentrated at Sabour, where there was no chance of doing much. We had done a little.

65,686. Were there, amongst the experts whom you lost, any who had foreign degrees?—There were two. The Agricultural Chemist retired, and we had to cut down the number of Deputy Directors by three. We lost one Deputy Director whom we had recruited on probation; we had to send him on to another Province.

65,687. Was he an expert from Great Britain?—Yes. He is now in the Punjab.

65,688. What was the prejudice against him?—There was nothing against him in particular. They cut down the number of Deputy Directors. We had proposed seven Deputy Directors, and we had recruited two against the proposal sanctioned by the Secretary of State, but the committee recommended that the number should be cut down to four.

65,689. *Professor Gangulee*: Did you have any experts from Bengal?—We had an Assistant Mycologist and an Assistant Entomologist. We were very largely staffed by Bengalis. We took over the college from Bengal and the Bengalis came with the college.

65,690. *Mr. Kamat*: In the memorandum submitted to us there is a note by the Director of Industries with reference to the question of a model sugar factory for this Province. Do you agree with the views of the Director of Industries in regard to this pioneer sugar factory?—I think it was quite a sound proposal, as far as I remember. I did not think it was quite the right way to run it. I put in a note at the end stating where, exactly, my views differ.

65,691. Supposing that proposal were pressed on Government, would you support the idea?—I think Government ought to take a share in it but not run it. I do not think it is much use Government running factories themselves.

65,692. Would you agree that, if we had that factory, we would have the advantage of being in a position to train Indians in the technique of the sugar industry?—That would be one of the incidental advantages but I do not suppose we should get very many men.

65,693. Would you not attract men if you had a really good factory?—I cannot say. I do not know whether the factory would employ chemists. I think that could probably be arranged with some of the existing factories.

65,694. If firms like Messrs. Begg Sutherland and Co. prospected about the possibility of such an industry becoming profitable in South Bihar and if they really found that it was not a feasible proposition, do you think it would be a success if Government took it up?—I would suggest that Government should lend capital to a private firm and not work it themselves. The whole thing depends upon whether the ryots will sell their sugarcane to the factory. Personally I have no doubt but that, if they got a decent price, they would sell the sugarcane.

65,695. I have not been able to follow, entirely, what you suggest in your scheme of taxation; I think you suggest a special tax on contracts?—What I mean is that if the law enables people to get a large income without doing anything at all, you might tax the contracts which make that possible.

65,696. You mean contracts relating to sales, mortgages, leases and similar transactions?—Anything relating to land and buildings.

65,697. On such transactions, there is already a stamp duty?—What I suggest is that the tax should be proportional to the income secured on the contract.

65,698. Take a concrete case: Suppose I take a farm or a field from some zamindar for two years on an annual rent of Rs. 500, how much

would the tax, according to your proposal, come to?—That is entirely a matter for the people who assess the tax. My idea is that the tax should be proportional to the income received.

65,699. Would you propose that all such transactions should be terminable at the end of one year?—That would be a good thing, if it were practicable. I do not know anything about that, of course.

65,700. Would that give security to tenants who wish to take up farms and improve them?—I do not know whether the security exists now. I suppose the landlords generally renew it from year to year. My idea is that the law enables people to secure large incomes on contracts and I think we ought to tax the system which makes that possible; that is, we should tax the contracts.

65,701. *Mr. Danby*: Do you consider that Sipaya, which is situated in the most remote corner of the district, is a suitable place for cane experiments and a place to which cultivators would go to see the work that is done there?—I do not think it is. I did think it would be so some time ago but it appears that conditions at Sipaya are quite different from those in the eastern part of Bihar. The water level is higher. I think a number of small farms would be better from the point of view of varieties of cane; that is really all that we want.

65,702. Does your Deputy Director of Agriculture ever visit the big cane centres in North Bihar?—I think he does. He has only been there a short time. His time at present is taken up with training the men. The fact is that we have practically not touched North Bihar at all.

65,703. Do you consider that your organisation for cane testing in North Bihar is sufficient for the area?—No. We are going to have a farm in every sub-division. We have not got enough men. There are only two such farms now for the whole of North Bihar.

65,704. Why has the Agricultural Department, so to speak, neglected North Bihar in comparison, say, with Chota Nagpur? Does not the population and the area of cropped land in North Bihar largely exceed that of Chota Nagpur?—Of course it is a very much more important part of the Province, but it is much more difficult to make improvements there. The planters have been there for a long time and they have raised cultivation to a pretty high state in some ways and we saw less need to work there.

65,705. The planters in North Bihar cultivate some 80,000 acres at the present time. Do you not think that seed might be distributed, and experiments with fertilisers done through them, with advantage?—It might, if we had a big enough staff. I think if we did not give them much help, such work would bother them a good deal. We should have to rely on them a great deal for seeing the work through.

65,706. At present the Agricultural Department is not in touch with the planters at all?—There is very little touch.

65,707. Do you consider that a farm situated near Pusa would be of great benefit?—I think so. We have been trying to get one for some time. I think the Sipaya farm ought to be moved to Pusa, if possible; or rather the headquarters of the Deputy Director might be moved to Pusa or to Muzaffarpur or Samastipur, or to some place in the central part of North Bihar.

65,708. *Sir Thomas Middleton*: I think you are in charge of the compilation of statistics?—Yes.

65,709. At what stage do they reach the Director of Agriculture? I see from the memorandum that the figures that are supplied to you are based almost entirely upon guesses?—Practically, yes.

Mr. A. C. Dobbs.

65,710. I also see that you have got a gazetted officer charged with the interpretation of the reports from the districts?—The reports in each district go to the Collector. He has a Sub-Divisional Officer or Deputy Magistrate under him who practically does this work in his office. He is a gazetted officer. He sends it to me.

65,711. How can a responsible gazetted officer usefully interpret figures based on guesses?—The only thing he can do is to alter them according to his own guesses.

65,712. You have in this Province about eight million acres under rice? What is the probable error in that figure?—The annual figures are not at all correct. It might be seven millions or it might be nine millions. We get the permanent figures from the Settlement Department. They are fairly accurate.

65,713. When is a settlement made? Once in how many years?—I do not know exactly whether it is once in thirty years. Anyhow, the rice area would not change much because there is a very distinct line between the rice area and the area under other crops.

65,714. You have one million acres under wheat?—I am afraid I cannot say. There is absolutely no means of checking that from year to year.

65,715. *Professor Gangulee*: Have you followed Mr. Hubback's method?—Yes. I proved to him that our present statistics were absolutely valueless. He saw it at once and tried to improve things.

65,716. *Sir Thomas Middleton*: How much of your time is devoted to crop forecasts?—Very little. I leave that almost entirely to my office. I examine it when I get it finally. If I think that the paddy crop is going to be a failure in a very large part of Bihar or if I think that the reports are pessimistic, I say so. That is all that I do.

65,717. *The Chairman*: Do you recommend, the setting up of a sugar factory in order to see whether the cultivator is willing to sell his cane?—Yes, if there is no other way of persuading the cultivator.

65,718. As Director of Agriculture, would you recommend that Government should go forward with the scheme?—I think it would be a good thing but I would not encourage it by giving a Government guarantee. I should offer five lakhs, or whatever is necessary, to any company who would start it. Personally I think there is no doubt but that the cultivators would sell the cane.

65,719. You have dealt with various attempts to start chicken farms in the Province. In some of the papers that we have it is suggested that Government should subsidise chicken farms. Would you recommend Government to take any step of that sort?—No. I do not think it has been proved that that could be done on an economic basis at all.

65,720. If the industry could be made profitable it should stand on its own legs without Government assistance?—I should give it assistance in the way of experiments and information, but that is all.

65,721. Do you think that your department is devoting a proper share of its attention to dry cultivation in the poorer tracts?—I think so, particularly in Chota Nagpur, where the cultivators, as a rule, do not take much interest in dry cultivation. We have, in fact, devoted much more attention to dry cultivation, in proportion to its importance amongst cultivators, than we need have done.

(*The witness withdrew.*)

The Commission then adjourned till 10 a.m. on Tuesday, the 22nd November, 1927.

APPENDIX A.

In my reply to Question 4 (*a*) and (*b*) of the Questionnaire I made a few suggestions for the co-ordination, throughout India, of research in general and agricultural research and higher education in particular, by the addition of a few specialists in the Agricultural Department under the Government of India and the formation of a board of the heads of departments.

Dr. Clouston has now supplied me with a copy of a note submitted by the Director of Agriculture in Burma on this subject and a comparison of the two sets of proposals brings out the advantages and disadvantages of each and accentuates the principles on which the advantages depend.

The organisation suggested by Mr. McKerral, consisting of an Advisory Board of Agriculture, an Administrative Research Committee and the co-ordination of the executive under a Director General of Central Research, has the great advantage of simplicity and of a solidarity that would probably facilitate the securing of funds for agricultural work. Its weakness seems to lie, firstly, in the size and miscellaneous composition of the Board of Agriculture, which is hardly competent to define objectives sufficiently for effective control or to give advice on special points, and of the Research Committee which would find it difficult to agree as to the allotment of funds to the varied interests that it would represent; and, secondly, in the illusory nature of the executive control.

The former difficulty might be got over by delegating work to permanent sub-committees, with power to co-opt representatives of special interests; but the reverse procedure of constituting special *ad hoc* committees, like the Cotton Committee, for raising and administrating funds, and of fusing these committees with the Board of Agriculture for more general advisory purposes would seem likely to achieve both objects more effectively.

There remains the co-ordination of the research work by the Director General of Central Research, under the heads of special bureaus or sections to whom funds would be allotted. As regards this my own experience suggests two great difficulties. The first is the difficulty which a single officer would have in estimating the worth of specialists in several highly technical branches of applied science before recommending their appointment for a long term—and in agricultural work, long term appointments are very desirable for the sake of continuity. It is difficult to get men of proved ability to come out to India, or to recruit such men in India itself; and there is no adequate means of training and selecting them after recruitment. A specialist, even if himself keen and competent, is apt to accept as assistant a man of mediocre energy and ability because of the difficulty and uncertainty of getting a better; there is no way of getting an outside opinion, and a permanent appointment may pass into progressively less competent hands.

The control of a Director of Research would, in fact, be completely ineffective outside his own special province, and funds might be very generally wasted on futile work, or even by expert laziness.

The second difficulty lies in the co-ordination of the work in several very special lines of investigation under competent scattered workers. A cotton specialist who would voluntarily consult a biological statistician or any expert in a line in which he had not himself specialised, were such an expert within reach, would resent interference from a plant breeder, however eminent, who had not specialised in cotton.

The concrete proposals made by Mr. McKerral suggest the above criticisms; but, looking back, they apply only in less degree to the suggestions made in my own written evidence, which would provide a very partial and imperfect means of stimulating and co-ordinating scientific and educational work in India.

In fact, in view of the paucity of scientific workers in India, nothing less than the consolidation of all scientific work throughout the country can afford a satisfactory basis for the healthy and co-ordinated development of its several branches.

A great All-India University, in pleasant, healthy, rural surroundings, at which the majority of the scientific departments of the Government of India, the Archæological, Meteorological, Geological, Statistical, Agricultural, and Veterinary departments, had their headquarters, and even the Kodaikanal Observatory a foothold, could achieve the necessary consolidation of scientific work and could at the same time form a residential educational centre for graduates from all the Indian Universities, and a research centre, not only for Indians, but, with the widest view of Indian interests, for foreigners interested in special problems, such as the control of tropical diseases in men and animals, which could best be studied in India.

For purposes of general post-graduate education, and in order to promote the widest possible culture, it would be necessary to have departments of philosophy, science, letters and art, while for purposes of rural and industrial development there would be faculties relating to the categories into which simpler studies are grouped for practical purposes with a view to particular objectives, such as agriculture, medicine, engineering irrigation, building, commerce and any other important forms of national activity.

Lectures in the several special branches of study included in the several syllabuses would be given by officers of the University nominated for the purpose, and the education so given should be followed up by the periodical publication of the latest results of research in, and within the purview of, the University, in suitable form for reference for workers throughout India.

Government would have to staff and provide the funds for such a University in the first instance, and would be able to give it the prestige necessary to induce other Universities to seek affiliation, by securing really first class men and by giving preference to its doctorate or other degree as a qualification for appointment to Government service in all departments. Heads of Government departments could be given a status, if only honorary, in the University, with a view to facilitating co-ordination. Such control should however be relaxed as soon as, and to the greatest extent, possible, so as to give the University an independent initiative and make the several faculties independently responsible for advice given in their respective spheres.

The University would, to some extent at any rate, provide a reserve of trained scientific and technical experts for all purposes, who would ordinarily be employed on research and education in the University itself and would be recommended for outside appointments for which they were suitable.

The agricultural work under the Government of India, the Provincial Governments, and special committees would be co-ordinated with that of the University by the Agricultural Adviser who would suggest the most convenient forms of reports for the purpose and take action in respect of any deficiency revealed in them in the way of ineffective work or want of facilities.

He would, for instance, make enquiries from the provincial Directors of Agriculture, inspecting if necessary and offering to find any expert help that could be given, as for instance in the better planning of field experiments or the investigation of special problems by experts of the University

The Agricultural Adviser would himself be a member of the University Faculty of Agriculture, which should ultimately be in a position to recommend suitable candidates for most of the appointments in the Agricultural Department or under special committees in India. Research stations like Muktesar and possibly even the Forest Institute at Dehra Dun would in effect be staffed and controlled by the University Faculty acting in an advisory capacity to the head of the Government department. The head of such a station might in fact be a member of the University faculty—thus providing a valuable safeguard against any tendency of personal prejudice on the part of an Agricultural Adviser to influence administrative matters excessively.

Special committees such as the Cotton Committee would frequently be able to obtain the men required for appointment under them from the University, and would freely consult the faculties concerned. It might sometimes be convenient for them to hold their meetings at the University itself. The faculty concerned would also review generallly, keep in touch with, and even publish, work of sufficient interest to deserve their notice—an unification of scientific control of economic work which can probably not be so effectively achieved in any other way.

In my written evidence I suggested a very large increase of administrative officers in the Provincial Civil Service, almost as much for purposes of adult education as for economic development; in fact, one way or another, any policy of rural development seems to require such an increase. It would not be the least of the functions of the University to provide a larger education for such officers than any now obtainable in India. Both from this point of view and from that of attracting, for research purposes, men of character as well as ability, who will be guided by the facilities for work of a high quality which an appointment offers even more than by the pay, I can hardly exaggerate my opinion of the importance of locating such a University in healthy, comparatively cool, and pleasant surroundings; and of establishing it on such a scale as will give the maximum possible scope for social and intellectual freedom and intercourse. The University should be a modern University but on the lines of the older Universities in England—removed from the atmosphere of competition and turmoil of large towns and devoted to universal, if primarily to rural, culture.

The organisation for agricultural research suggested above comprises:—

1. An All-India University where as much as possible of the scientific work under the Government of India should be centralised with a view to the co-ordination and healthy development of all its branches and where a post-graduate education would be given such as would equip graduates of provincial Universities for the adequate representation of culture in general and the interpretation, in particular, of Governments ideals in the country at large.

2. Special committees for the promotion of important Indian agricultural interests, charged with the raising and administration of funds for their special purposes, including scientific work.

3. The Board of Agriculture, widely constituted for the purpose of general discussion and representation of all agricultural interests.

4. The Agricultural Adviser, who would be, as now, President of the Board of Agriculture and of the special committees, and Liaison Officer between the Government of India and the Provincial Governments, would be relieved of his present administrative work in other capacities and would be given instead, *ex-officio*, a prominent position in the Agricultural and perhaps Veterinary faculties in the University.

From the point of view of this organisation Pusa is merely an incidental problem due to the amount of money sunk in buildings and equipment there. But the Gangetic alluvium, in which Pusa is very centrally situated, is of such immense extent and relative importance in Indian agricultural economy that the concentration at Pusa of a sufficient number of special enquiries to utilise the whole of the buildings to advantage will present little difficulty, and will have advantages which will compensate for a certain restriction of free choice of locality. It would in fact be a single station where research in several different directions, generally co-ordinated with research at other isolated stations, would be carried on under the central organisation suggested above.

Cattle breeding, sugarcane, oilseeds and other staples, fruit, vegetables and other garden crops, tobacco and other drugs, and spices, are subjects in which such research requires a station in the Gangetic plain.

APPENDIX B.

Note on Rural and Agricultural Education and Agricultural Training.

It has been pointed out to me that the evidence hitherto submitted by me to the Commission represents an almost purely destructive view of the forms of agricultural education hitherto tried in Bihar and Orissa, and makes no considerable contribution to the solution of the problem that it implies.

That is true: and if the Commission will accept the explanation that I was diffident about going outside the terms of Question (2) of the Questionnaire, and making constructive suggestions on the whole subject, simply because the views I have arrived at are very definite and in opposition to the whole policy of the Government of India and most of the Provincial Governments hitherto, I shall welcome the opportunity of escaping from a most invidious position by laying my conclusions before the Commission—for what value my twenty years work in India may attach to them.

To explain these conclusions some further personal explanation is necessary. Very briefly:—coming out to India after eight years of farming experience at Home I soon realised that I should have to learn farming again before I could justify my appointment as Principal and Professor of Agriculture of the Punjab Agricultural College by framing a course in "Agriculture" for the syllabus. I had taken the mathematical Tripos and made a special study of plant breeding and manurial experiments, but I could neither discover any means of immediately effecting any economically practicable improvements (and my point of view as a practical farmer permitted no other criterion of improvement than practical economy), nor could I see my way, by methods however scientifically designed to that end, of effecting any considerable body of such improvements within any reasonable time. The most I could attempt to do before the college opened would be to rationalise the local practice.

This I should have to do entirely myself; it would have left me no time to develop the experimental technique that was urgently required if any considerable early improvement in practice was to be effected; it would have been of no direct value to cultivators; and, however valuable from the point of view of general education, the preponderating influence of specialists on the Board of Agriculture and in the constitution of the college put any idea of using the college for an experiment in rural education out of the question. Moreover I was not in the Education Department.

If my views had crystallised then, as they have since, I should probably—appreciating that education has an even wider significance than agriculture—have laid them before Government and asked to be transferred to the Education Department. As it was I saw only one course open to a scientifically educated agriculturist who had realised the uselessness of a scientific education as a direct aid to farming as contrasted with experimenting, and, after some delay, succeeded in obtaining a Deputy Director's appointment and devoted myself to the improvement of agricultural practices and of experimental technique—of which work I have now had twelve years' experience.

Mr. A. C. Dobbs.

It is with the training of men for this latter purpose that this note primarily deals, although I have in fact maintained an interest in rural education in general.

My experience suggests that there is, in India, an extraordinarily wide gap, due perhaps to the accentuation of initial differences of ability by the common handicap of having to learn a foreign language, between the man who is at all competent to plan and control precise investigations, and the man of similar educational experience who is only capable of supervising the details and adapting them to local circumstances with the help of local labour.

The training of staff therefore falls into two totally distinct categories :—

(*a*) that of men of trained scientific intelligence for planning and directing the work,

(*b*) that of a subordinate staff for supervision in the field and farm office, and for demonstration of the results to cultivators.

As a preparation for the former the very best education obtainable in India is not extravagant. The training, for which I have made suggestions in a previous note, should therefore be post-graduate and should be thrown open to the widest possible field of recruitment.

But I understand that the possibility of utilising the Patna Veterinary College for agricultural education has been mooted, and I therefore tender a suggestion that I have not felt called upon to make before because I was not consulted by the Local Government as to the constitution of the Veterinary College and because I apprehended that some unsatisfactory compromise, by providing undergraduate vocational training at considerable expense for the men on whom the provincial Agricultural Department will almost solely depend in future for scientific work on agricultural problems, might greatly prejudice a completely satisfactory solution of the problem on larger, and probably no more expensive, lines.

While, then, I would strongly deprecate any attempt to give a course leading to a degree of Bachelor in Agriculture, and doubt the possibility of obtaining a satisfactory staff for a provincialised Agricultural Department by that means, I suggest that a cheap and effective contribution towards the solution of a very difficult problem might be made, if Patna University were to provide for combinations of general graduate qualifications more useful from the agricultural point of view, in the following way :—

(i) Correlate the work in the Patna University generally with that on the Veterinary College farm, by means of a scientific rationalisation of rural phenomena and of the work on the farm, as suggested in my reply to Question 23 (*a*) of the Questionnaire. A motor service could be arranged between the town and the farm if necessary.

(ii) With this object particularly in view, establish University Chairs of Animal and Plant Genetics (in lieu of the Economic Botanist and one of the Veterinary Professors) and, if funds permit, of Biological Chemistry, and post the incumbents on the farm.

As a corollary, abolish the appointments of Economic Botanist and Agricultural Chemist in the Agricultural Department and arrange for chemical research required by the Provincial Agricultural Department to be done in Patna University.

(iii) Form a Faculty of Rural Science in Patna University, including the Director of Agriculture, whose headquarters, together with those of the Agricultural Engineer, should be transferred to Patna.

Incidentally, in order to minimise possible practical difficulties, I would suggest that of all the departments of Education that of Engineering is the most self contained, both in theory and practice, and that the Engineering College could perhaps with advantage be transferred from Patna to Sabour where the farm, with its facilities for studying irrigation, pumping, road making, draining, and the erection of small buildings, might be made of the greatest use in relating the training in the college to actuality. Space could thus be provided, if necessary, for expansion of the University at Patna in other directions.

Sabour lies half way between the railway workshop centres of Jamalpur and Sahebganj and is nearer to Calcutta than Patna.

As regards the training (*b*) of a subordinate staff for supervising field experiments and demonstrations I see no way of relieving the Deputy Directors of the burden except by adding to their number and that of their Assistants, as I have already proposed. I suggested in my oral evidence that the difficulty was a temporary one, and that when the full programme of farms was complete the numbers requiring training of this kind would be small. But on reflection I must qualify that suggestion by adding that there is already a considerable demand for men of this type—from manure dealers, rich amateurs who wish to take up farming, and very occasionally from landed proprietors. I anticipate that this demand will widen and increase with the number of improved practices introduced by the Agricultural Department.

On the other hand I have recently suggested to the Deputy Directors, who are all in favour of some attempt to centralise as much of this training as is of a general nature, that an annual examination in the recently issued Departmental Manual of Accounts and Farm Management, which it is proposed to hold at Sabour, would give an opportunity for delivering lectures and giving demonstrations in respect of so many of the known possible improvements on the present practices of cultivators in the Province as lend themselves to illustration or description in general terms. If any material advance can be made on these lines it may be possible to develop a short course which would combine so much practical training as can be given at Sabour with the maximum of theoretical explanation that applies generally throughout the Province, without suggesting more than is safe of the dogmatism which men whose education has been limited to that of an Indian School so readily acquire.

The idea has only recently germinated, and I should not normally trouble Government with it at this stage; but it seems to contain the promise of considerable development, and I should meet any request by the Local Government for specific proposals with regard to education of this type, by reporting progress in the direction indicated and recommending that it should be fully explored before expenditure on any more ambitious scheme is contemplated.

In conclusion, it appears to me that the demand for higher technical education in agriculture is so small that it can more easily and much more satisfactorily be met by a wide course of post-graduate training at a single centre for the whole of India than by a degree course in a provincial college; while the materials for the local training of subordinates for practical agricultural work in any formal way have still to be elaborated in this Province.

Mr. A. C. Dobbs.

I venture therefore to plead again for the view that no standard of general education below the highest obtainable at existing Indian Universities can be regarded as a satisfactory basis for higher technical education; and that nothing should be done that will either in any way further prejudice the establishment of a central institution for research and post-graduate education, and for the maintenance of the widest possible relations between scientific workers on agriculture throughout India and even outside it, or that will facilitate the staffing of the provincial Agricultural Department in Bihar and Orissa with locally trained men of inferior scientific qualifications and a narrow provincial outlook.

In particular, I would point a warning of the danger of reviving the confusion between vocational agricultural and general rural education that was dispelled by the failure of Sabour College as the ultimate result of the, to my mind very wise, decision of the Government of Bengal that it should stand or fall by its merits as a purely vocational institution. Its re-establishment on the basis of affiliation to Patna University, or the creation of a Professorship of Agriculture and an Agricultural Faculty in Patna University, would, for me, connote the extinction of the last hope of establishing agricultural education, or the Agricultural Department, on a sound basis in this Province within the present generation.

Tuesday, November 22nd, 1927.

PATNA.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.	Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Sir THOMAS MIDDLETON, K.B.E., C.B.	Professor N. GANGULEE.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.	Dr. L. K. HYDER.
MR. H. CALVERT, C.I.E., I.C.S.	Mr. B. S. KAMAT.

Mr. E. DANBY, Babu A. P. VARMA } (*Co-opted Members*).

Mr. J. A. MADAN, I.C.S., Mr. F. W. H. SMITH } (*Joint Secretaries*).

Mr. D. QUINLAN, M.R.C.V.S., I.V.S., Director, Civil Veterinary Department, Bihar and Orissa.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) (ii) Research into the diseases of livestock and problems connected with livestock industry has practically speaking never been undertaken in this Province, as no facilities either in staff or equipment have been available during the past twenty years. Its importance was not recognised in spite of frequent applications for additional staff for this work alone. Government has now, however, taken up this question and a large laboratory, with a staff which will undoubtedly have to be strengthened in the near future, has been sanctioned in conjunction with the new Veterinary College scheme and it is hoped that work will be started in July 1929.

In respect of research in other parts of India, a certain amount has been carried on at Muktesar, but it has been spasmodic, mainly because the Director of the Institute is more or less fully occupied in the administration of the large estate and laboratory and in meeting the needs of the Provinces in respect of the sera and vaccines which they require.

To bring research to bear on the veterinary problems confronting the country, it appears to be necessary that there should be a central organisation under a Director with headquarters at Muktesar. Owing to the enormous distances between Muktesar and the provincial capitals and also because of the problems which each Province has to solve, it is most important that laboratories should be established in the Provinces but not necessarily in all, as it would appear that three or four fully staffed and equipped institutes would be far preferable to a larger number not so efficient. In any case, there will be considerable difficulties in recruiting the necessary staff even for the smaller number.

These institutes should, as far as possible, frame their programmes and work in consultation with the Director of the Muktesar Institute, to avoid overlapping.

As regards finances, buildings and equipment should be provided by the Provinces but in view of the fact that the work undertaken may be of Imperial importance, a portion of the recurrent cost of these laboratories should be defrayed from the central revenues, or from a fund similar in constitution to the Indian Medical Research Fund. When the scheme for the new Veterinary College was placed before Government, and it was thought that it might not meet with the approval of the Legislative Council, a suggestion was made by me that an experimental station should be established and that the three Provinces of Bihar and Orissa, Bengal, and Assam should combine in order to have one large laboratory at Patna, financed by a research fund to which the Governments and the people of the three Provinces should contribute.

(c) As research into animal diseases in this Province has never been undertaken, practically all diseases of livestock require investigation in the field, and research in the laboratory. For example, I should like to see further studies carried out on—

(1) Rinderpest.

(2) Hæmorrhagic Septicæmia.

(3) Black Quarter.

(4) Anthrax.

(5) Surra in cattle.

(6) Coccidiosis.

(7) Parasitic diseases (very important).

(8) Diseases of the udder in cows.

(9) Kumri.

(10) Non-sweating in imported horses.

Investigations should also be carried out in respect of poisonous or supposedly poisonous plants and grasses, to which only very limited attention has been paid up to the present. The urgency of these enquiries has several times been admitted by the Board of Agriculture.

Diseases due to a deficiency of some important constituent in the food also require immediate enquiry, as the results may have far-reaching effects on the cattle-breeding industry in this Province. I would like to bring to the notice of the Commission the remarkable work carried out by Sir A. Theiler and his staff in South Africa on these diseases. The reports are models of their kind and have received unstinted praise in medical journals.

QUESTION 15.—VETERINARY.—(a) The Veterinary Department should not be under the control of the Director of Agriculture for the reason that there are questions to be dealt with, and even animals to be treated, which have no direct connection with agriculture. For example, public health comes within the purview of the staff of the Veterinary Department, but the Director of Agriculture, as far as I am aware, has no direct interest in it.

There is another aspect of this question to which attention should be drawn and that is where the head of one department is in control of another which has more or less identical interests at stake; it would be placing a great strain on human nature if the controlling officer did not allot more funds for his pet projects than for those of his *quasi*-opponent. It has happened in the past and would undoubtedly occur

again in the future. At any rate, as far as this Province is concerned, the change has been for the better, the Director of Agriculture being of the opinion that each department should have its own Director responsible to one Minister.

(*b*) (i) In this Province, veterinary relief is given through the medium of hospitals and dispensaries, the former in charge of stationary or hospital Veterinary Assistant Surgeons and the latter of touring Assistants. The pay and allowances of the Veterinary Assistant Surgeons is borne partly by Government and partly by the local body in the following proportions:—

Stationary Veterinary Assistant Surgeons.

	Rs.	a.	p.	
Local body, five-sixths	81	5	0	per month.
Government, one-sixth	16	4	3	,, ,,

Touring Veterinary Assistant Surgeons.

	Rs.	a.	p.	
Half borne by local body	62	9	0	per month.
Half by Government	62	9	0	,, ,,

The local bodies must maintain the hospitals and dispensaries in respect of menial staff, medicines, instruments, buildings and repairs, as well as the cost of sera and vaccines.

Government bears the entire cost of two hospitals and eight dispensaries in the five non-regulation districts.

All hospitals and dispensaries are subject to inspection by the officers of the Veterinary Department.

This system is satisfactory inasmuch as—

(1) it encourages the establishment of veterinary hospitals and dispensaries by local bodies, and

(2) Assistants can treat non-contagious diseases when not employed in suppressing outbreaks.

The great drawback to the dispensaries in charge of travelling Assistants is that, in many cases, the areas over which they have to tour are so great that it is impossible for them to give the close attention to the patients that the live-stock owner requires and expects. Consequently when a patient dies or is not cured the Assistant, and through him the department, suffers in repute.

The sanctioned scale of Veterinary Assistant Surgeons for each subdivision is one stationary and two touring Assistants. More Veterinary Assistant Surgeons would, I believe, be taken by district boards were Government to bear the cost of the sera and vaccines used in the suppression of outbreaks, as in some districts it is a heavy drain on the resources of the local body when disease is widespread. It may mean re-casting some items of the budget. Government should bear the entire cost of suppressing all contagious diseases of live-stock in respect of sera and vaccines and staff additional to that employed in the districts under the terms quoted above.

(ii) During the past few years, there has been considerable difficulty in getting district boards to sanction extra staff not, as is often stated, because funds are low, but because the members are ignorant of what can be achieved by an efficient staff. A reference to recent Government

resolutions on the work of local bodies discloses the fact that many district boards have not come to the limit of their resources but have large closing balances and that the Veterinary Department is hampered in its development because they will not spend money on it.

The main cause is that many members of these bodies belong to castes or to the professions which are not directly interested in agriculture; or, though they may derive their incomes from agriculture, take no further interest in it beyond receiving rents, do not recognise the many difficulties the ryot has to contend with, the result being that his (the ryot's) troubles are relegated to a very inferior position on the agenda, when the question of ameliorating them arises. Consequently, proposals put forward do not get the support they ought to. But in spite of that fact there is general recognition that this department is doing good work with the staff at its disposal.

Although the Legislative Council has met all proposals placed before it without curtailment and even has approved of the work of the department to the extent of resolving that a Veterinary Assistant should be placed in each *thana* area, my own opinion is that this suggestion, although encouraging from the department's point of view, is not possible financially or even socially, as it is placing the onus of providing relief on Government, while the local bodies and private persons or corporations refuse to accept their responsibilities.

The Co-operative Department, as far as I can see, is the one great factor to which one can look with confidence for widespread rural development, and in the case of the Veterinary Department, beyond the help which Government and local bodies can equitably and legitimately give, it should undertake the expansion of veterinary relief in all villages in which it has societies. The people themselves will have a direct interest in the work of their paid Assistants and this is a side of the movement which should be fostered and encouraged.

(iii) Government should not, in my opinion, take entire responsibility for veterinary relief throughout the Province. Government is not at present in a position to state to a district board that it requires more veterinary help, and that it should work up to the sanctioned number of Assistants within a certain period. This is a great drawback and prevents expansion. Certain of the poorer districts, especially those in Orissa, should receive grants towards the erection of buildings for hospitals and dispensaries.

The present arrangement by which Government lend the Assistants and meet half the cost of pay and allowances is satisfactory from every point of view and solves, on the part of Government, the problem of finding work for a staff during periods when outbreaks are not prevalent. Government, on the other hand, by a slight increase of its staff Assistants (apart from leave reserve Assistants) at the headquarters of the ranges will be in a position to ensure prompt attendance and sufficient help during outbreaks.

(c) (i) Hospitals in towns do good work, especially in districts where cattle are worth treating. As far as my experience goes, the success of an hospital depends entirely on the Assistant in charge. If he possesses a good knowledge of his profession, is up-to-date in his methods and displays energy, he does well anywhere even under the most unpromising conditions, and especially is this the case when he has been sufficiently long in an area to get known and have his work appreciated, and can introduce something new in the way of treatment that is better than anything the local "medicine man" or the owner of the animal ever dreamt of. For example, the intravenous injection of tartar emetic in cases of nasal granuloma has very beneficial effects.

within even a few days, with the result that in areas where this malady is prevalent and the Veterinary Assistant is successful and liked, his reputation is made, and other classes of patients are brought for treatment from long distances.

In connection with the success or failure of an Assistant, much depends on his caste though of course it ought not to count; but the fact remains. For example, castration is abhorent to Hindus and in consequence considerable difficulty arises when attempts are made to introduce the Burdizzo castrator, although it is a comparatively humane method of performing an absolutely necessary operation. At any rate, it is far preferable to the methods practised in the villages. As regards the classes of patients treated in the hospitals and dispensaries, there has been a great change owing to the introduction of motor transport, and I feel sure that within another five years, very few horses will be found for treatment. As a consequence, stables which were put up some years ago in anticipation of an increase, with the advent of a better veterinary service, are now in many cases unoccupied.

(ii) Full use is not made of dispensaries in charge of touring Assistants because the areas under their control are so large that it necessitates their absence for several days or even weeks at a time. With an increase in the staff this will be remedied.

(*d*) The chief obstacles met with in the suppression of contagious diseases are:—

(1) Delay in notifying outbreaks at the *thana*,

(2) religious objections to inoculations, and

(3) absence of legislation.

Reporting of disease depends mainly on the *chaukidar*, the source of all statistics and information. As he usually reports only once a week at the local police-station, several days may elapse before the information filters to the Veterinary Assistant. This system is being improved by the officers in charge of the police-stations being given lectures on the different contagious diseases during their training period at the Police Training College, Hazaribagh, and also by rewarding the *chaukidars* for efficient notification and for help in the villages.

Owners also do not recognise the importance of notification and, in consequence, outbreaks which could easily be dealt with often assume alarming proportions and cause serious losses.

Religious objections are being gradually overcome as the ryot realises the benefits of this line of treatment, but he is not sufficiently educated to permit blood to be taken from one animal in order to protect others, as would be the case in simultaneous inoculation.

Legislation is essential for control of contagious diseases, and I would advocate its immediate introduction were it not for the fact that the staff is at present so inadequate. The legal enactments should cover compulsory notification, segregation, disposal of diseased carcases, inoculation of contacts and, what is of very great importance, the movement of cattle.

In a Province like Bihar and Orissa which lies directly across the routes used by dealers taking cattle to the lower Provinces, the absence of legislation will be appreciated as there is no control of the herds which in many cases spread infection far and wide. The problem is a difficult one owing to the long frontier and it is further complicated by the presence of the Orissa Feudatory States. To be effective, legislative measures should also extend to the Indian States.

I am unable to recommend any other measures for the suppression of contagious disease. They would lead to waste of valuable time and increase the chances of heavy losses. To even attempt to find them is a waste of time and money.

(*e*) With one or two exceptions, no difficulty has been experienced in obtaining all the sera and vaccines required.

(*f*) No fee is charged for the use of sera and vaccines, nor is it desirable that owners should have to pay for it until the department has a sufficiently large staff to effectively deal with all outbreaks, because, to charge fees and not be in a position to give proof that outbreaks can be effectively dealt with would be very detrimental to progress. I do not believe that a fee would be a deterrent if a better service were available to deal with the outbreaks and to treat affected animals.

The Co-operative Department can be of the greatest assistance in helping the spread of better methods of treatment and prevention of animal diseases. Its help is sought on every possible occasion, as its influence in villages where societies exist is undoubted.

As regards simultaneous inoculation, its introduction would be of enormous benefit, but in my opinion the time is still premature for its introduction on a large scale. As far as this Province is concerned, I would not advocate its use until such time as Government had formulated its cattle improvement policy and was in a position to declare certain districts as breeding areas in which it was proposed to distribute bulls extensively.

In such areas, with the powers conferred by legislation, every animal capable of contracting rinderpest should then be compulsorily inoculated. To use this method indiscriminately would be economically undesirable and would, instead of being an aid to cattle improvement, leave the ryot where he stands at present—feeding or trying to feed probably fifty to sixty per cent more cattle than his fodder permits.

(*g*) No progress can be made without research, and the present unsatisfactory state of the Veterinary Department in India can be put down to the want of foresight of the Government of India, and of Local Governments, in not providing sufficient scientists to carry out investigations where disease is so widespread and the losses to the ryot so enormous. Conditions now, in respect of research, are infinitely worse than they were twenty years ago. That being so, it is of the utmost importance that—

(1) laboratories which are at present available should be provided with the personnel, equipment and finances necessary to make them a success, and

(2) additional laboratories should be established in Provinces where funds can be found to build and equip them.

As regards Muktesar, full use is not being made of this institute for research for the following reasons:—

(1) The staff is entirely inadequate and requires a Physiological Chemist, a Physiologist and Pharmacologist in addition to the present staff. The two former should deal with questions affecting the digestibility of Indian foodstuffs and the physiology of Indian livestock, as distinct from European livestock on which our knowledge is at present based. A Pharmacologist is required to study poisonous plants and indigenous drugs in so far as they relate to livestock.

(2) The scientific officers have too much administrative work to distract them. It is impossible to combine administration

and research without one of them becoming less efficient, and this is especially the case in India owing to climatic and other well-recognised conditions.

(*h*) This question can best be answered by referring the Commission to the method adopted by the Medical Research Fund Association which has a central institute at Kasauli and laboratories at Calcutta, Bombay and Madras and also, I believe, at Shillong. Muktesar and the proposed provincial institutes must work in unison, otherwise Government and the tax-payer will not be getting full value for the expenditure incurred.

(i) As regards this question, it is a hardy perennial. It appears to me that the most satisfactory and convincing method of replying is to refer the Commission to the progress made in the Union of South Africa, to Canada and to the United States of America where livestock problems are dealt with by properly constituted veterinary departments, which are controlled by officers of the highest attainments. The reports of these departments are the best arguments for the appointment of a chief directing officer and adviser for India. At no time since the post was abolished are his services more needed than at present. In the next few years his appointment will be imperative if the Indianisation of the service, as foreshadowed in the Lee Commission, matures. Conditions will then arise in which young and inexperienced Indian officers will be placed in charge of the provincial departments, without having anyone in professional authority to whom they can turn for advice.

The argument put forward that there is no work to warrant the resurrection of this post is fallacious. The foundations are laid in the Muktesar Institute and in the provincial departments and in my opinion the appointment of the right type of officer—and there have been several who would have filled such an appointment with credit to themselves and to the advantage of the State but have retired in disappointment—would lead to advances in every direction, because the field for research and development is so great.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i) The suggestions put forward for the improvement of livestock in this Province are contained in the following enclosures:—

(1) The note* submitted to Government in 1919 and again in 1923.

(2) The report* and recommendations of the Cattle Committee which was appointed in 1925.

The question, as far as I can see, resolves itself into two parts:—

(1) Improvement of cattle for the supply of milk to towns.

(2) Improvement of agricultural stock, especially in the milking capacity of the cows, and by this means the solution of the rural and urban milk supply.

As regards (1), many people recommend that town supplies can best be secured by cross-breeding with imported bulls of recognised milking breeds, Ayrshire, Friesian, etc., and country cows. From the point of view of the consumer, there is no objection to this procedure provided that:—

(*a*) the progeny are immunised and the bull calves castrated, and

(*b*) provincial revenues are not called on to meet any portion of the cost of such schemes.

*Not reprinted.

If financial help is required, the consumers in the area to which the milk is supplied should be prepared to shoulder their responsibilities and meet the expenses connected with the importation of such bulls.

(ii) As regards (2), this and (*a*) (ii)—the betterment of the dairy industry—can be answered together, as I firmly believe that the improvement of cattle in this Province is entirely dependent on the development of the dairy industry.

The possibilities for increasing the material prosperity of the people of this Province, especially in the districts between Nepal and Chota Nagpur, are enormous when one considers that practically the whole of Bengal and Assam are dependent on this Province for their supply of draught, plough and dairy cattle, as well as for a very large proportion of the dairy produce at present consumed. As an instance of the rail-borne traffic in cattle in 1926, 57,318 were carried by the Bengal and North-Western Railway (metre gauge) from the districts north of the Ganges to Bengal and Assam. At Hiranpur cattle market in the Santal Parganas, close to the Bengal frontier, 86,501 cattle and buffaloes changed hands in 1926-27. From stations on the main line of the East Indian Railway in the Shahabad district alone, close on 2,500 cows were exported, mainly to Bengal, *i.e.*, to Calcutta and to the coalfields area. But these figures are small when compared with the numbers that are taken by road. The movement now starts with the first showers in June, and continues without interruption until April of the following year. It is impossible to collect figures, but the numbers cannot be far short of 500,000. It will thus be seen that the trade as regards bullocks and buffaloes is one to be fostered.

In respect of cows, the case is different. Any schemes which did not secure that milk should be produced in the mofussil rather than in the towns and cities would be wasteful of public funds because it is wrong in principle. In the first place Government could spend unlimited sums and still be no nearer the solution of cattle improvement, because the best cows would continue to be sold from the breeding areas for milk production in the towns and this would nullify such efforts as were made. Improvement of bullocks or of milch cattle cannot be carried on under such conditions. In Bombay, Calcutta and other large towns, cows are slaughtered when they dry off and are consequently lost for breeding. This is one of the most serious objections to town and city dairies.

Secondly, the consumer cannot get milk at a reasonable price when it is produced in a city, where rents, rates and taxes and cost of foodstuffs are high. The price at which it is sold must necessarily meet these charges and still leave a profit to the producer.

Thirdly, on hygienic grounds it is better for the consumer and for the cow that the milk should be produced as far away as possible from cities and towns. The conditions in the Calcutta cowsheds are appallingly bad.

Good cattle will be found only in districts where climatic conditions are suitable, food is abundant and cheap, and where the people themselves place value on their animals. The districts in the Tirhut, Patna and Bhagalpur divisions meet these primary conditions in all respects. The Patna division has a further great advantage in that a canal system is available whereby fodder crops can be grown even when there is a scanty rainfall. In Chota Nagpur, a certain amount of *rabi* is grown, but conditions are not so favourable for cattle improvement as in the northern divisions. As far as Orissa is concerned, no *rabi* is grown but silage can be produced. In addition to the above natural advantages, the service of trains on the East Indian Railway, the

Bengal Nagpur Railway and the Eastern Bengal Railway is such that milk from these divisions after a cool all-night journey could reach Calcutta in the early hours of the morning in time for distribution.

In order to initiate this idea in the divisions named above and to provide farms where cattle-owners would be able to observe up-to-date methods, I should like to see the following programme carried through :—

(1) The establishment of breeding farms in the following areas—

(i) Patna—this has already been sanctioned,

(ii) Shahabad district,

(iii) Tirhut or Purnea (Bhagalpur Division), and

(iv) Orissa.

Cows of the local or *desi* breed selected for milk yield only should be used. Bull calves reared on these farms would be distributed in villages in "selected" or "declared" breeding areas. Good bulls are required everywhere and even though the milk yields of their dams to start with would not be high, the bulls would still be of great economic value as better bullocks would be bred from them, and, by raising the quality and constitution of the progeny, a foundation would be laid for developing the milk yield later.

(2) When the bulls were ready for distribution, the Co-operative Department should step in and establish dairies, and out-stations for milk collection. It should also undertake the distribution of the bulls, start milk-recording societies and, in general, control cattle-breeding and milk production through the staff in the villages.

If the Co-operative Department is unable to organise the industry on these lines, private enterprise should be encouraged. Some attempts have been made but have not been successful, mainly due to the fact that sufficient capital was not provided to tide the companies over the first few years' difficulties. With sufficient capital, organisation on European lines and propaganda, there appears to be no reason whatever why the milk trade in this Province should not prove a great success.

Good roads or fairly good roads are essential for milk collection. Accordingly, in parts of a district which could not be developed by the Co-operative Department owing to bad communications, the district board should take over the distribution of the bulls under the advice of the officer directing livestock breeding. The difficulties attending improvement of livestock under the Reforms appear to be greater than under the old conditions, as no reliance can be placed on any local body's offer of help, or, even after proposals have been approved, that the policy initiated will be continued from year to year. I see no prospect of making any sort of effective progress within a reasonable time without legislative measures being taken. These should be on the lines of livestock improvement Acts in other countries, *i.e.*, Government declares the policy and the local body must follow it by striking a rate, and this rate cannot be earmarked for any other purpose. Legislation providing for registration of dairies, veterinary inspection of cattle and sheds where milk is produced, as well as for prevention of adulteration and for grading of milk is also needed.

To attempt improvement under existing conditions leads to waste of public funds and is hardly likely to increase the enthusiasm of promoters of such schemes, as Europeans at any rate like to see something tangible resulting from their efforts.

Mr. D. Quinlan.

Sheep and goat breeding are also subjects of very considerable importance and would well repay investigation and organisation. There is a large export trade carried on between this Province and Bengal for home consumption and export. Fifty thousand one hundred and five sheep were exported from Calcutta in 1926-27.

(iii) Animal husbandry will be taught in the new Veterinary College and it will be part of the Veterinary Assistant Surgeons' duties to instruct villagers. It is a subject which should receive the greatest attention in veterinary colleges, as experience in India leads me to believe that if proper attention were paid to the feeding and hygienic surroundings of livestock, the incidence of disease would be very considerably reduced. In other words, the prevention of disease by hygienic measures such as all livestock owners should understand or be made to understand is a much more logical way of keeping disease in check than curative or suppressive measures.

The Government of India would be doing a real service if it produced for distribution a series of films illustrating the different phases of dairy farming and dairying. The films should be, in my opinion, entirely British and Indian. Films showing objectionable features in existing dairying practice are also desirable.

(*b*) (*i*) It would be difficult to state what percentage of the cattle of the Province are uneconomical, but it cannot be far short of forty per cent, taking the Province as a whole. In the northern divisions, the percentage is not so high. Where there are large open areas or jungle, the percentage is probably fifty, *e.g.*, in Chota Nagpur and Orissa where the animals are just producers of manure. It will accordingly be seen that overstocking of common lands is the practice and is undoubtedly, with the absence of selection, the principal cause of the deterioration of the cattle.

A good deal is written from time to time regarding the opening of reserved forests to grazing. Personally, I consider that the Forest Department have a very important duty to perform for posterity and this should not be interfered with on any pretext whatever. The severest restrictions should be placed on grazing rights in protected and reserved forests. I should like to see rules brought in which would exclude:—

(1) barren cows and cows over a certain age,

(2) bullocks over a certain age, and

(3) bull calves, except those selected for stud purposes.

Young cows and young stock (heifer calves and bullocks) should be selected before admission. The fees should be such that it would not pay to graze inferior stock.

Measures such as are outlined could not at present be introduced because the Forest Department is understaffed.

The acquisition of additional waste lands by the Forest Department is called for as, with proper care and treatment, they would be capable of supporting a large population of good cattle. As grazing is wasteful especially when long, grass cutting and silage making, as opposed to grazing, should be encouraged as much as possible in the villages near the forests, but for this purpose it would be necessary to instruct the staff of the Forest Department in the production of silage.

Everything considered, it may be said without fear of contradiction that the traditional method of cattle-breeding has seen its best days and that, if progress is to be made, cattle-owners must be prepared to spend money on improvement and not, as at present, expect to get something for little more than nothing.

(ii) I do not think there are any enclosed pastures; the grass borders of fields would supply practically no fodder owing to the small area of the *bunds*.

(iii) There is usually no shortage in the cultivated areas in the northern divisions. Provided the ryot would recognise that four bullocks cannot be kept in good condition on an amount of fodder which is sufficient only for two, there would be no difficulty in respect of fodder. It is the uneconomical animal which causes the serious losses.

(iv) Throughout the Province, there is an absence of green fodder during the dry season, but this of course could be remedied if people would take the trouble of growing crops for silage or of utilising grasses for silage.

(v) No research has been done on fodder or feeding stuffs in this Province, as far as I am aware.

(*e*) In this Province, the majority of the landlords live on their estates practically the whole year through. This is an advantage, but from the point of view of helping agricultural improvement, my experience is that they take practically no interest in the subject. They are very conservative and are difficult to convince that money spent on their estates is a good investment. They do not continue schemes of improvement initiated, for instance, when under Courts of Wards management, nor are they anxious to make use of the demonstrations in respect of agriculture and cattle-breeding which can be seen without much expenditure of effort. That is the crux of the problem—expenditure of energy. It is what makes progress so difficult, waiting for the next person to do something, or if a move has been made, continuing it until the idea has fructified. It is extraordinary how young athletic-looking men run to seed when they reach a certain age. When one thinks one has something good, it proves a failure through lack of interest and apathy.

The education of the zamindar so that he can be in a position to take up his responsibilities and prove himself a real asset in the advancement of agriculture should be a feature in any system introduced, and, as a preliminary, it is important that the younger generation should be taken away from the influences at work in the ordinary college where the course is entirely literary and law and Government service appear to be the sole ambitions of the majority of the students. My suggestion is that Sabour, which is at present not being used as an agricultural college, should be opened as an institute where the sons of zamindars from the time they become fit to go to college—about thirteen or fourteen years of age—would be trained on more or less public school lines. Particular attention should be given to manly games, *e.g.*, riding, polo, foot-ball, etc., to citizenship of which there is a great deficiency at present; in addition, they would receive training in agricultural practices, cattle-breeding and estate management. It would appear to be desirable that other Provinces should be visited as the knowledge displayed on questions of agricultural improvement is very limited. The ordinary zamindar will not believe the written word and accordingly ocular demonstration is the only method of reaching him. A scheme such as is outlined would be a beginning and it appears to be the only way in which any permanence can be given to improvements, because a zamindar has still very great influence in his villages and, accordingly, if he can be got to see that by taking up certain crops or systems of cultivation, or by attention to cattle hygiene, his ryots will benefit without expense to himself, the difficulties besetting agricultural improvement would be considerably reduced. There is, at any rate, the hope that his knowledge will filter through to the ryots in some way or other.

Mr. D. Quinlan.

In respect of the ryot, when the zamindar, fails the establishment of farms, where fodder crops are grown and cattle are bred and reared on scientific principles, offers the best chance of success.

One other point to which I should like to allude is the distribution of honours among Indian agriculturists, zamindars and ryots. The legal professions and industry and Government service have in the past had a fair share of such honours, but I do think that a fuller recognition of the services rendered by the producers of the raw materials on which so many industries have been built is needed and deserved. Any means which will show them that their services have not been forgotten by Government and that they will receive due reward would help to focus attention on agriculture.

Oral Evidence.

65,722. *The Chairman*: Mr. Quinlan, you are Director of the Civil Veterinary Department in the Province of Bihar and Orissa?—Yes.

65,723. I think the decision to establish a veterinary college at Patna has been taken?—Yes.

65,724. When do you expect the college to be opened?—In July 1929.

65,725. Are you yourself satisfied in every respect with the plans and arrangements that have been made?—I think the plan and general arrangements are quite satisfactory, except in regard to staff. There is a certain amount of discussion at present as to whether the Professor of Hygiene, who is to belong to the Provincial Service, is to be specially recruited from England or not. My own opinion about the Professor of Hygiene is that he ought to be a European, or at least, if he is an Indian, his qualifications and experience ought to be seriously considered. I feel certain from my experience of Indian conditions that the question of hygiene and animal management in general, and of preventive medicine in particular, are two subjects which cannot be separated, and if we wish to teach up to the standard that we ought to in this college, we shall require a Professor of Hygiene of the very highest qualifications. The improvement of cattle and of agriculture in general will depend entirely on the attitude which Government intend to take in connection with this appointment. For instance, animal husbandry depends wholly on the knowledge that is brought to bear on the feeding and the general hygiene of farm stock. It is one of the most important subjects taught at the veterinary colleges, either in India or at Home. It is a subject of fundamental importance.

65,726. Do you look forward to research work being undertaken in the college?—Yes; but whether the pay which we are offering will be sufficient to attract candidates of the type we require to this Province or not, I do not know. Personally I do not think it will. One of the reasons which I put down for this is that when the department has been divided into water-tight compartments as provincial departments tend to become, suitable men will not be attracted in the same way as when there is a larger service.

65,727. The course will be a three-year course; is that so?—I am trying to get the course made four years, and I think it will have to be four years if the subjects are to be taught properly, because the ground to be covered is so very wide.

65,728. Would affiliation with the Patna University be possible on the basis of a three-year course?—I should not think so, unless we happen to get candidates with higher qualifications than those possessed by the candidates we are recruiting at present. The general knowledge of a matriculate is very low.

65,729. Is it your aim to work up to a four-year course, to effect affiliation with the University and to give a degree?—Yes, I think it might be possible to become affiliated, but I do not quite know what the advantage of a degree will be.

65,730. Would it represent anything in terms of attraction to the candidates?—I do not think it would. The difficulty that we have got at present is one of supply and demand. Take the Agricultural Department, for instance. The work in that service entails very great hardships; and in consequence it does not attract graduates from the Universities. The opening up of waste land and industrial developments in Bengal and other Provinces means the drifting away of a number of graduates from this Province, and that in itself lessens the number from which we can recruit.

65,731. What are your arrangements for recruiting to the new Superior Provincial Service?—At the present time we are sending State scholars to England for training.

65,732. All of them?—Yes. Any recruits that we now require must be drawn from among them. Recruitment of Europeans has been definitely stopped and that in my opinion is a fatal error, as it restricts the field from which we can now select our officers. As regards the training of State scholars in England, I have had considerable correspondence with the Secretary to Government on this question. One of the points urged by me as being absolutely essential is that these students should be compelled to see practice in one of the dairying districts. Their work in India, and in this Province in particular, is entirely connected with cattle; consequently the experience gained while apprenticed to a Veterinary Surgeon in one of those districts would be invaluable. The State scholar recently appointed was advised to see cattle practice and also to get some idea of the dairying business. Instead of doing so he spent his vacations at a dog hospital somewhere in Kensington. That, I consider, was waste of valuable time The provision for practical training is one of our greatest difficulties. The solution of the problem is not easy as English practitioners do not readily accept their services, even when a premium is offered.

65,733. How many of these State scholars are now working in the Province?—We have only one, and there is another under training in England.

65,734. What about the material available?—I did not see the second scholar, but from accounts available, he appears to be a very desirable scholar.

65,735. Who selects these candidates?—A selection board which consists of the Minister, the Director of the Civil Veterinary Department, a Provincial Service officer and two non-officials.

65,736. *Professor Gangulee*: Are they selected from among graduates of the Patna University?—From any University in India; it does not matter which University so long as he is a desirable candidate.

65,737. B.Sc. or M.Sc.?—Not less than B.Sc.

65,738. *The Chairman*: The policy to effect improvement in the cattle, which you describe, was laid down by the Provincial Cattle Committee; is that so?—Yes.

65,739. Broadly speaking, is the scheme to improve the local breed for purposes of milk supply?—Yes. It has to be improved by selection mainly from the milking side.

65,740. To improve by selection amongst local breeds, and not to attempt crossing with foreign breeds?—We are crossing; we have just got some cattle from Thar Parkar.

65,741. With Indian cattle, not with European?—No, not with European.

65,742. Which do you regard as most important, improvement in the draught quality of the animal or improvement in the milking quality?—I think both can go together. Milking quality is most desirable in this part of the country.

65,743. Is milk consumed by the agricultural population in Bihar and Orissa?—It is in certain parts; the people consume considerable quantities of milk and its products, for example, *ghi*, *dahi*, whey, et cetera.

65,744. Do you take this view (that it is more important to improve the milking quality) because there is an existing demand or because you expect a demand to be created?—The demand is here in Patna; already we supply a certain amount from the farm.

65,745. In Patna town?—In Patna town, and later we shall supply the hospital and the educational institutions.

65,746. That is purely a local market, is it not?—Yes.

65,747. Apart from this purely local demand from urban centres in the Province, is there a demand from the cultivators for milk for themselves and their families?—Yes.

65,748. Is the tendency in this Province for owners of cattle to pay attention to, and feed, only the milch animals and to neglect and half starve the calves?—That is a feature prevalent everywhere. Wherever milk is sold for profit the *gowala* starves the calves, whether bull or heifer.

65,749. Do you regard it as sound policy to aim, at the outset of your experiments, at the dual purpose animal?—Undoubtedly sound. In my opinion, it is the only way in which the cattle improvement question can be solved. To produce a cow which would eventually supersede the buffalo would be a fine achievement and it can be done.

65,750. Meantime the buffalo holds the field?—Yes, to a pretty large extent in certain tracts.

65,751. Does the general bodily conformation which makes for a good draught animal go, as a rule, with good milking qualities?—I do not think it does here, but there is no reason whatever why one could not get a good bullock from a good milking cow. Indian draught cattle generally tend to slope towards the tail, that is, from the croup downwards.

65,752. Is it the characteristic of a good milking cow that it is capable of consuming large quantities of fodder?—Yes.

65,753. Do you see much risk in presenting the cultivator with a good milking animal on the ground that the diet which he would be likely to give her might be insufficient?—No, because if one goes through the country and sees the cattle, one will be just as likely to get a good bullock from a cow giving six to eight *seers* of milk as from one which is giving only two to three *seers* of milk, the former only consuming very little more or actually the same amount as the latter.

65,754. It is true of course that the capacity to produce milk from the food rather than to build up fat is typical of the good milch cow?—Yes.

65,755. But is it not the case that if the milk is to be produced in reasonably large quantities the cow has to be nourished?—Yes.

65,756. Is there sufficient fodder in the Province?—Not for the present cattle population, but in the breeding tracts sufficient fodder is available. When I say breeding tracts I mean tracts where stall feeding, as opposed to grazing, is carried out.

65,757. Are those the tracts where milk is required by the rural population?—Yes. You will get them along the Ganges, the Gogra, the Gandak and other rivers in North Bihar.

65,758. Is stall feeding common in those tracts?—In the Northern division you will get stall feeding practically constantly, except of course with superfluous and useless cattle; animals which receive any attention at all are stall fed.

65,759. So that the area in which stall feeding is practised is the area in which there is a demand for milk?—Yes.

65,760. *Sir Henry Lawrence*: In that area you get the best cattle?—Yes.

65,761. *The Chairman*: How about the milk yielding capacity of the cows in that tract at this moment?—I think the majority give about two *seers*, except in certain areas from which there is a large export trade in cows. In these five to six *seers*, or more, of milk is common.

65,762. Is nourishment between the time of birth and the moment of maturity of great importance in the case of the cow?—It is most important.

65,763. Is the small size and light bone of the cow, as compared with the male ox in this Province, due very largely to insufficient feeding during the period of growth?—It is due to that, and also to early calving, especially in the tracts from which cows are exported.

65,764. I think the Agricultural Department, as opposed to your own, already maintain their farms at Ranchi, Monghyr and Sabour?—Yes.

65,765. Is it proposed that they should continue to conduct those farms?—I do not know what Government has decided to do at present, or what they intend to do in the future.

65,766. Might there not be some danger of confusion in policy and duplication in the work if the Agricultural Department continued to conduct those farms?—It is quite possible.

65,767. It is the case, I think, that Government take the view that the Veterinary Department should be responsible for all live-stock and dairying work. Is that so?—That is the intention, but it has not actually been decided at present what my duties will be.

65,768. What is your personal view as to the wisdom of that issue?—It depends altogether on what experience the veterinary officer has had in livestock work. If one could get a veterinary officer who was keen on the job, I should certainly put him on as Livestock Officer.

65,769. You state, on page 127 of your note, that you think that attention given to sheep and goats in this Province would repay itself. Has any work been done on sheep and goats here?—No.

65,770. Apart from the question of quality, do you think that there is an opening for an extension in these pastoral pursuits?—I do not think it will be possible after some years, with the opening up of the country I have in mind, and especially in the districts where sheep are kept and grazed most extensively. In Gaya, South Shahabad and some other districts the number that could then be grazed would hardly justify Government in spending money on development.

65,771. Have you any definite proposals to lay before the Commission in this matter?—No.

65,772. It appears from your answer to Question 15 (*b*), that you are well satisfied with the working of the system of veterinary dispensaries, according to which the responsibility for those is divided between your department and the district boards. Is that arrangement working fairly well?—It is working fairly well.

65,773. Are the district boards, taken as a whole, showing any active interest in veterinary work?—I think they are. It is a question of getting the members to take more interest in it. I think the arrangement, as I have pointed out in the note, is probably the best arrangement that can be made as regards Government. I do not think it is the function of Government to supply veterinary aid for sporadic disease.

65,774. I think you make the appointments to the districts?—Yes.

65,775. Do you consult the district boards about these appointments?—Yes. They are asked to provide the money for these posts before the appointments are made.

65,776. Do you ever have a complaint from any district board that the officer whom you send is not suitable for their district?—Yes.

65,777. What action do you take?—If we have reserves available to replace the men, we replace these men; we transfer them. In many cases the complaints are more or less frivolous; often it is really a question of the man's caste and that kind of thing. We do not pay any attention to such complaints.

65,778. Would it be true to say that, on the whole, you work harmoniously with the district boards?—Yes.

65,779. What proportion of the district boards with which you deal have official chairmen, if any?—I think there are at present only five. They are in the non-regulated districts, the Santal Parganas, Hazaribagh, Ranchi, Palamau and Singhbhum.

65,780. In answer to Question 15 (*c*), you mention the fact that there is a great deal of prejudice against castration even by the Burdizzo method. Can you tell the Commission whether you see any diminution in that prejudice?—We introduced it two years ago, and there has been very great difficulty in getting even the Hindu assistants to take up this method. They say it is *infra dig.* and against their religious principles to castrate.

65,781. I suppose an officer who himself objects to this method is not likely to be a good agent for persuading cultivators to allow their animals to be so treated?—No.

65,782. Why is it *infra dig*?—It is against their religious principles to start with, and then it is only the low caste Hindus or Mahommedans who carry out the castrations in the villages.

65,783. Do you think that time will solve that difficulty?—I do not think there will be any difficulty after a few years.

65,784. Does rinderpest inflict heavy losses on the rural population of this Province?—Yes, in certain years; it usually appears in waves.

65,785. Once in ten years?—Once in five years in certain tracts.

65,786. Have you estimated, at all, the loss caused by rinderpest in this Province?—No, except as regards the numbers and what the average cost would be.

65,787. How many animals do you lose per epidemic or per year?—It may be about 15,000. That would be taking the Province as a whole.

65,788. Every year?—Yes. I am referring to the loss from rinderpest only.

65,789. *Sir Henry Lawrence*: Are your figures in any way accurate?—They are accurate to this extent, that the Veterinary Assistants have to take the figures in each village. They visit the villages during an epidemic and they note down the numbers of animals which have been affected and which have died. It is on these figures that we base our statistics entirely.

65,790. There is no separate registration for each village?—There is nothing like that in this Province.

65,791. *The Chairman*: Rinderpest involves very heavy loss, pecuniary and otherwise, upon the cultivators, does it not?—Apart from the actual loss of the cattle it will be found that, in areas where the epidemics occur, cultivation ceases more or less through the loss of the bullocks. For example, an outbreak occurred in the Shahabad district in 1916 and over eight thousand cattle died from this disease alone. As a result a large area went out of cultivation that year.

65,792. Would the taking of effective steps to mitigate the risks of rinderpest be a substantial contribution towards the agricultural progress of this Province?—I do not think there can be any doubt about it.

65,793. Perhaps you will agree that the serum-alone method, valuable as it is, has definite limitations and that the simultaneous method is the method which is most likely to produce a permanent improvement in the situation?—It is the only method that is likely to prove effective but it is impossible to carry out.

65,794. I am coming to that point: What experience have you had of serum-simultaneous inoculation in this Province?—None except at Pusa.

65,795. Are you familiar with the campaign for serum-simultaneous inoculation which is at present being carried on in Mysore?—I have not had any correspondence about it, but in October I met some officers in training at Muktesar. They were from Mysore and had come there to learn technique.

65,796. Are you familiar with any of the work in this direction which has been carried out in Africa?—Yes. I have read about it.

65,797. I see from your note that you take the view that the time has not yet come when, in this Province, any large scheme of immunisation by the serum-simultaneous method would be practicable. Would you tell the Commission why you take that view?—I do not think it is worth while spending money on it unless we have some definite scheme to prevent disease generally, and also for cattle breeding. I think the two should run concurrently.

65,798. You do not think that the prevention of preventible disease is an essential preliminary to cattle improvement in that, until a breeder has reasonable security for his investment, he is very unlikely to invest?—That is a sound argument for the establishment of widespread preventive measures.

65,799. Do you not think that immunisation by any means, if it can be achieved, should precede the attempt to improve the breeding?—I think the two should go together. The line I take is that, if you have to start your immunisation with large numbers of cattle which are at present quite useless, you are spending money for nothing. I think you must run your immunisation in conjunction with your cattle breeding schemes, and there again you want to have a Livestock Act to make any cattle-breeding scheme effective.

65,800. In that case, how many years do you think it will be before you have a reasonable number of animals whose lives are worth preserving?—I should think that in from fifteen to twenty years you would have made very good progress.

65,801. Would you require considerable preliminary experiment to be made before you fix upon the final details of a scheme for immunisation by the serum-simultaneous method on a large scale?—Yes.

65,802. Do you think it would be wise at this stage to begin those tentative measures which must precede the bigger campaign?—I do not think there will be any difficulty in carrying them out either. Preliminary measures would certainly be helpful.

65,803. You do not think there will be any difficulty in carrying out a large campaign for serum-simultaneous inoculation?—I do not think so. It depends on where you are going to start your campaign. There is no good, for instance, in starting it in an area where you have not got cattle that are worth saving.

65,804. I understand that there are three general schemes or lines of policy which you might adopt, any one of them or in combination. The first is to put a barrier—a belt of immunised cattle—across a certain line of cattle movement or round about a particular area in order to check the spread of the infection; the second is to attempt general immunisation of the major part of the cattle in the Province or in India as a whole; and the third is to select the animals of better quality which, in your judgment, are worth preserving and immunise them by the serum-simultaneous method and to leave worthless animals to their fate. Have you any views on that?—I think the last is the only feasible solution if you want to save expense to Government and to improve the cattle.

65,805. You told us a short while ago that ten to fifteen thousand cattle die each year in the Province and that their death inflicts immense economic loss and hardship on the cultivators, amounting in some cases to a cessation of cultivation. Do you think that the lives of these animals are worth preserving?—Yes, certainly. But I think you cannot do it unless you eliminate the animals that are useless.

65,806. I cannot understand why, by adopting the last method, namely, inoculation by selection, you should not proceed at once. It may be that certain animals are, in your view, entirely unsatisfactory. But on the other hand it would appear that if you protect the cultivators' oxen against this dreadful scourge you would, from the agricultural angle, be doing the cultivator and the Province an immense service?—Yes.

65,807. On page 127 of your note you say that 50,105 sheep were exported from Calcutta?—Yes, they are mostly sent to the Straits, Burma, the Andaman Islands and Singapore.

65,808. *Professor Gangulee*: Does that number include only sheep or are there goats too?—Some goats are included in the number.

65,809. *Dr. Hyder*: Did this number come entirely from this Province?—The greater part. I happened to be in the docks in Calcutta and I asked the man in charge where they came from. He said that they came from the Gaya district. It does not of course preclude their coming from the United Provinces. Practically the whole of the mutton supply of Calcutta is met from this Province.

65,810. *The Chairman*: You give it as your view, on page 127, that some drastic restrictions as to the right of grazing in forest areas would, on the whole, be in the best interests of cattle owners themselves?—Yes.

65,811. Would popular opinion support any step of that sort?—There are people who get something for nothing and so they would always be up against restriction.

65,812. But unrestricted grazing simply leads to the multiplication of useless animals, does it not?—Absolutely.

65,813. On page 129 you give it as your opinion that interest in agricultural matters amongst landlords and other natural leaders of rural society might be fostered if Government were to pay a compliment here and there in terms of honours?—I think that would be a very desirable step on the part of Government.

65,814. Is it your opinion that the man who takes an interest in agriculture and who encourages the cultivators in the way they should go, does the community, on the whole, a very good service?—There is no doubt about that.

65,815. Do many landlords take such an interest?—Not many that I know of. In this Province there are one or two. There is, at the moment, a pleader who has a large estate about 100 miles from Patna. He has started on very up-to-date lines. He has obtained tractor ploughs and is farming altogether about 5,000 acres.

65,816. *The Raja of Parlakimedi*: Was your proposal to open a college here popular among all the four Provinces concerned?—I do not think that it will be popular in Bengal; but in my opinion the opening of the college is the only solution of the present difficulties.

65,817. How was it viewed in Assam?—I think the Director in Assam would be very glad to send his students here.

65,818. So that there will be no difficulty in getting quite a number of students?—I do not think that there will be any difficulty on that score. Already we have forty-three. We have only to fill up thirteen more places.

65,819. What posts will the students passing out of this college be fit to take up?—Posts in the ordinary Subordinate Service. At present we get our men from the Bengal college. We are to teach only up to that grade. In addition to the teaching of the students, the subordinate staff will be brought in at certain periods to take 'refresher' courses.

65,820. That is to say, they will be styled Veterinary Assistants?—Yes.

65,821. To what higher standard may the Veterinary Assistant expect to rise?—He can become an Inspector; but in one or two cases we have promoted men to the Provincial Service.

Mr. D. Quinlan.

65,822. What work would such an officer be in charge of?—One such officer is at present in charge of a range which comprises some eight districts.

65,823. I presume that such promotions are made purely as a result of the good work turned out and the general interest evinced by the men?—That is so.

65,824. In this Province, what are the diseases that appear in epidemic form from time to time?—Rinderpest, hæmorrhagic septicæmia, black quarter, surra, anthrax and foot-and-month, and parasitic diseases.

65,825. What disease, in your opinion, causes the greatest havoc among cattle?—We have statistics about rinderpest, but if proper inquiries were made I should think that it would be found that parasitic disease was responsible for the greatest losses. The disease is due to presence of parasites in the intestines.

65,826. You complain that the department does not get timely intimation of the breaking out of such diseases in rural areas. Is it not possible to enlist the sympathy of the Revenue Department in this respect?—We employ every agency that is likely to give us any help whatever, but the usual agency is the village *chaukidar* and the police. Rewards are offered to *chaukidars* to bring in reports, so that I think their reporting is as good as it can be under existing conditions. It is mainly a question of staff.

65,827. Just as lectures are given to Sub-Inspectors of Police during their training, so also would you not like to adopt a similar method with Revenue Inspectors when these officers are under training?—Yes, that would be a useful thing indeed. We also give lectures to the officers of the Co-operative Department at certain times of the year at Sabour.

65,828. But Revenue Inspectors are officers who generally come into closer contact with the people than other officers do, so that lectures to these officials would be a very good thing, would it not?—Yes, I shall make a note of your suggestion.

65,829. *Sir James MacKenna*: What staff are you recommending for this new college?—Two European Professors (one for Medicine and one for Bacteriology and Pathology) and a third officer for Hygiene and Dietetics.

65,830. Would these also be research officers?—Yes; that would be a part of their duty when they are not teaching.

65,831. I see you lay considerable emphasis on the importance of the extension of research and on the work that Muktesar is doing. Is it your idea to develop the existing provincial institutes such as at Bombay, Calcutta and Madras, on the research side?—I think that should have been done long ago.

65,832. I think you suggested that the Director at Muktesar should be a Director of Research for the whole of India?—Yes, I think he should have control over research on the lines mentioned in my note. At meetings of the provincial officers, programmes would be decided, and from time to time, that is, yearly or half-yearly, further meetings would be called and progress of the works carried out in each laboratory compared. Touch would in this way be kept with each officer and unnecessary overlapping prevented.

65,833. That is to get away from the spasmodic research which has been going on all over the country?—Yes. If necessary, special research workers would be brought out for special subjects.

65,834. That would mean having a Director of Research at Muktesar. If you had a Director of Research, would the revival of the Inspector Generalship still be necessary, do you think?—My own opinion about that is that no progress can be made until you have an officer of that sort. Take for instance the Indian States; they are under the Government of India and if they look for advice they will naturally go to that Government for it, so that you want an officer who will carry some weight with the Government of India. Then again, in the case of the irrigation schemes and the canal colonies, these schemes come up to the Government of India for investigation and approval. I think that the policy of the Government of India in these cases ought to be to indicate what staff is required for each of the principal departments connected with these colonies, for example Agriculture, Veterinary, and Public Health. All these things should come under the purview of the Government of India. As far as my own experience goes, I must say that it was very unfortunate for me that when I first came out to this country I never had any officer, either from Simla or elsewhere, to show me what was required, or even to help me in the development of the department.

65,835. Have you considered how this centralisation would fit in with the new form of Government whereby Veterinary and Agriculture are transferred subjects?—The control of cattle diseases should be entirely central. If you are going to control cattle disease in this country you cannot leave it to Local Governments to say 'We will do this,' or 'We will not do this,' or 'We cannot do this,' or 'We cannot do anything at all'. Take the case of this Province which lies right across the roads that lead to Bengal, Assam and even to Burma. Cattle are exported from this Province into North Burma. If this Government took steps to control cattle disease and the United Provinces Government, for instance, did not, the result would be perfect chaos and waste of public funds.

65,836. You do think there is room for two central officers, namely a Director of Research and an Inspector-General?—Well, I was in Muktesar a month ago and I know that the work at Muktesar is very highly technical, consequently the controlling officer must be a highly trained technical officer. The medium between this officer and the Government of India should be an officer of the Veterinary Department. Of that I am fully convinced.

65,837. Was the post of Inspector-General in existence when you first came out to the country?—Yes.

65,838. *Professor Gangulee*: With regard to the proposal you make of having two central officers, the first officer to be the Inspector-General and the second to be the Director of Research, I wish to know whether you favour the idea of having a central Imperial research station?—Yes, provided that we are supplied with laboratories in the plains.

65,839. Have you any idea as to where you would like such a station to be located?—At Muktesar. I think that here, in Patna, where you have a farm and also a laboratory, it would be a good thing to establish a central station for Bihar, Bengal and Assam, because Patna is capable of a great deal of development. In respect of research, I must say that all research work ought to be conducted away from the towns, at least as regards cattle and livestock. You must get out into the district and as close as possible to natural conditions.

65,840. So you do not think that the mere appointment of a Director of Research, without giving him a central research station, would be

of any use?—No, he ought to be in charge of a station so that he himself may keep in touch with all that is going on, theoretically as well as practically.

65,841. How would this officer co-ordinate the research work that would be carried on in other Provinces?—Through a research fund association which, I think, is absolutely essential. The committee would be composed of officers of the provincial departments as well as scientific officers. They would discuss the subjects on which research is to be carried out, and would also meet at certain intervals to discuss the results.

65,842. And the Inspector General of Veterinary Service would be another officer, in your view?—Yes, a necessary officer.

65,843. How would you co-ordinate the control of veterinary diseases?—It depends on whether you recommend legislation for the control of diseases. The control of diseases must be centralised; you cannot split up the work among the Provinces; some Provinces may not have the money to provide the staff. In my opinion, it is the duty of the Central Government to take up the control of diseases, and if you legislate it will be the duty of the Inspector General (or whatever you like to call that officer) to carry out the control.

65,844. You are thinking of All-India legislation?—You cannot legislate in any other way.

65,845. On the question of veterinary research in the Province, I see that you propose to equip a large laboratory in connection with your college and you wish to have three research workers?—Yes.

65,846. What would be the nature of the work you propose to carry on in this laboratory?—That will be for the committee of the research association, which I hope will be started, to specify.

65,847. You are thinking of a provincial laboratory?—I have said in my note that it ought to be run in consultation with Muktesar.

65,848. There is the question of veterinary diseases to be gone into; then you attach a great deal of importance to animal nutrition; and you also want to take up the work of animal breeding. Thus, you propose to have researches on animal diseases, animal nutrition and animal breeding all concentrated in one laboratory?—Quite right.

65,849. You want to do all this with three research officers?—If Government agree and are willing to pay, there will be plenty of scope even for more officers.

65,850. The scheme of a veterinary college has been sanctioned by Government; have the funds been voted already?—We have got the funds for buildings and also for the staff; the scheme has met with the approval of the Council.

65,851. On the whole, you are quite satisfied with the support that you receive from the Legislative Council?—Yes.

65,852. From the annual report I find that about 82,000 animals suffered from foot and mouth disease last year; is that very serious?—No.

65,853. On the question of stall-feeding, could you tell the Commission what is the usual practice in the areas where stall-feeding is practised?—Cattle get oilcakes, pulses and *bhusa* of different cereals mixed together wet.

65,854. Neither your department nor the Agricultural Department has been able to give any suggestions to the cultivator on the question of stall-feeding. You state in answer to Question 16 (*b*) that no

research has been done on fodder. This problem of stall-feeding remains unexplored?—Yes.

65,855. The present practice of stall-feeding depends on the empirical knowledge of the cultivator?—Well, he cannot give more than he grows.

65,856. My point is that you have not been able to give the cultivators a direction?—The cultivator cannot go outside his holding and buy fodder and yet make an economic proposition of his cattle; if he has to buy fodder from outside, it will not pay him to keep his animals.

65,857. If that is so, no research work on fodder will be of use?—There are crops which can be grown for silage, and they will help him considerably, especially in the case of milking cattle.

65,858. On the question of your relationship with the district boards, you state in answer to Question 15 (*b*) that there has been considerable difficulty in getting the district boards to sanction extra staff. In the Administration Report of Bihar and Orissa for 1925-26, we find that the local bodies, in co-operation with which veterinary relief is administered, are constantly demanding fresh subordinates?—Some districts which have not sufficient funds do find difficulty, but in the majority of cases, especially in the three divisions of North Bihar, there is very little difficulty in getting them to sanction the necessary staff.

65,859. The difficulty which you refer to does not arise because the district boards are not interested in the problem of veterinary relief, but because they have not been able to provide adequate funds?—No. In some cases they have got the funds; but the district board may pass a resolution at one meeting to take an Assistant, but then someone gets up at a later meeting and moves a resolution and the district board says "We will not have the Assistant".

65,860. What is your view regarding touring dispensaries; are they any good?—I think they are doing good work, considering the distances and the areas they have to cover.

65,861. They have a vast area to serve?—Yes, in many cases; but where we have three men in a sub-division they do their work quite well.

65,862. On the question of the suppression of contagious diseases, you state that there are three obstacles. Firstly, you say that the agency for notifying the outbreak of diseases is very defective. Have you any suggestions to offer as to how you can improve on the existing system?—I do not think there is any improvement to be made. It is all a question of staff and the reduction of the area in which the Assistants have to tour. If the area is reduced, it means that the Assistants will come into contact with the villagers much more easily and they can get to the outbreaks much earlier.

65,863. The second obstacle is the religious objection to inoculation: is that a very serious one?—No; it is breaking down.

65,864. We are told in the Administration Report that the leading Pundits of the Province have blessed this idea of inoculation?—Yes. We got up a meeting of the Pundits of Puri and put the question to them, as to whether there is any religious objection to inoculation, and their opinion is that there is no objection to inoculation.

65,865. Have you taken steps to inform the cultivators about the views expressed by the Pundits?—Yes. The views as well as the names of the Pundits are printed in different dialects and distributed by the Veterinary Assistants.

65,866. So, the religious objection you refer to is not very serious?—No; it will break down in time.

65,867. Have you any dairy experts at the present time in this Province?—I am supposed to take up that work, but so far have not had any pay for it.

65,868. You propose to start dairy farms in the Province without a dairy expert? At present you have no such officer?—No, except the manager of the dairy farm, who is an expert in that particular line. He was recommended by Mr. Smith, the Imperial Dairy Expert.

65,869. Have you any farm under you?—Yes, the Patna farm.

65,870. It is under you, not under the Department of Agriculture?—Yes.

65,871. And the farm at Sipaya?—It is under the Department of Agriculture.

65,872. *Sir James MacKenna*: Do they breed any cattle there?—No. They rear buffalo bull calves and send them out to the districts.

65,873. They have given up the big scheme?—Yes.

65,874. *Professor Gangulee*: The view of the committee over which Dr. Clouston presided was that the objective of cattle-breeding should be to get the dual purpose animal?—Yes.

65,875. And you are pursuing that policy?—Yes.

65,876. On the question of the economic aspect of cattle-breeding, you told us that there is a great deal of export of cattle from this Province to Bengal and other Provinces. If so, why does not cattle-breeding pay?—It depends on whether you get your grazing free and on whether conditions are such that you can get rid of your surplus stock easily. Cattle-breeding would pay if you were able to use the cows as milk producers. At the present time they do not produce milk, and if they produce only bullocks once in two years they cannot pay.

65,877. But you have a demand for 500,000 head for export; and yet it does not pay?—It does not pay the cultivator; it pays the *dalal*. The *dalal*, I should think, is the person who makes most out of it. I should think that Mr. Danby would be able to enlighten you on that question. There is a large number of cattle dealers living in and near his district and in the Muzaffarpur district.

65,878. What is the existing arrangement for the distribution of stud bulls?—Any one who wants a bull gets it.

65,879. To whom should he apply?—The only farms that supply them are Ranchi and Monghyr, and a few are supplied from Sabour. They apply to the Director of Agriculture or to me.

65,880. Has the price of cattle gone up recently?—It has gone up since 1914, but in the last twelve months there has been a drop.

65,881. What factors regulate these fluctuations in prices?—I should think the principal factor is the price of jute in Bengal. If you get jute in demand in Bengal, the rise is reflected in the markets here. With high prices for jute, or the chances of high prices, you will find the price of bullocks increasing here.

65,882. What facilities have you at the present time for a rapid diagnosis of disease?—Except in the three laboratories that we have, *i.e.*, one in Patna, one in Muzaffarpur and one in Cuttack, we have no facilities.

65,883. Where have the officers in charge of these laboratories been trained?—The Veterinary Assistants have been trained at Madras and Muktesar.

65,884. *Mr. Kamat*: You said that legislation for the control of contagious diseases should be All-India legislation. I quite see it should be central legislation for all the Provinces, but I would like to know what would be your machinery for the enforcement of the law for the prevention of contagious diseases. Would it be under the control of the proposed Inspector General?—By him and through the provincial officers and the Provincial Governments. You have already got your provincial staff, and it should be at the disposal of the Inspector General in the same way as, in England, you get veterinary surgeons appointed part time inspectors to carry out the work of controlling diseases of animals. It would not pay the Government of India to have a special staff.

65,885. That is the proposal about which I am asking you. Supposing an All-India Act is passed, the Government of India cannot maintain a very large staff throughout all the Provinces for enforcing that law. Now, you wish to have an Inspector General. I ask you, what would be the relation of that Inspector General to the provincial officers, and how would he operate?—The Inspector General would visit a Province and see whether the arrangements were satisfactory. If the Inspector General's report was unsatisfactory as regards the staff or the measures adopted for controlling disease, it ought to be within the power of the Government of India to say to a Local Government that an increase of staff is required in that area. We must have that officer and central control to make provincial control effective; if the Local Government failed to carry out the suggestions the Government of India would have to meet a portion of the cost of the provincial staff.

65,886. The Government of India would have to meet the cost?—If the Local Government were unable to meet the cost of staff, or if it objected to it, the Government of India should be in a position to say "The disease must be suppressed and you must do it"; or, another *via media* would be for the Government of India to meet the cost of the provincial staff.

65,887. According to you, therefore, it involves a sort of subsidy from the Government of India to the Provincial Government?—Yes.

65,888. It also gives a final determining voice to the Inspector General with reference to the policy adopted in the Province?—Yes. You must have one officer only for the control of disease; otherwise, it is an impossibility; the provincial officers should be under his control as regards preventible diseases.

65,889. In that case, who would have the final control? Are the provincial veterinary officers to be under the control of the provincial Minister or under the Inspector General?—I suppose the Minister would be responsible to the Council for a portion of the cost of administration, as it will affect that particular Province.

65,890. With reference to the help which you got from the Pundits of Puri in the matter of popularising inoculation, did you also similarly try for their help in the matter of making the new castration method popular?—No. That was previous to the introduction of this instrument.

65,891. Your department has not yet invoked the assistance of these Pundits?—No, not yet.

65,892. Do you think it would be worth while to do it?—I think so. I think it is only a question of demonstration for the Hindus in the villages to accept it.

65,893. If the department obtains the confidence of these religious Pundits, it will be to the benefit of the department as well as of the public?—Yes.

65,894. Regarding your suggestion for legislation for controlling dairies and the prevention of adulteration of milk, at present I think corporations of large cities like Calcutta have the power at any rate to check the adulteration of milk. Have you watched the results of such attempts?—I do not think it has been found to be practical in Calcutta. There has been too much intrigue and graft going on; that is what I hear.

65,895. That is to say, although the powers under the law do exist, they have been rendered ineffective in actual practice?—Yes. As regards the supply of milk to towns, my opinion is that it ought to be taken from the country, and all suppliers of milk should be registered, in the same way as is done in England. The retailers in the towns should also be registered and pay a fee for a license. That is the only way in which one can control the supply.

65,896. Do you mean to say that what has now become ineffective in cities would be made effective if the dairies and milking sheds were transferred to the country?—Yes, and also if suppliers in the towns were licensed. When I say suppliers, I mean the retailers. It will have to be retailed in the towns from the dairies in the country.

65,897. In certain big towns the law has been there, and the licensing of retailers has been tried, but it has been found ineffective in actual practice?—Yes.

65,898. You suggest, as a remedy against that, that if the dairies were shifted to the country, the policy of licensing retailers would be effective. I want to know what is the connection between the two?—If you have a retailer and if he commits any offences against the law as regards adulteration or dirty milk, you can withdraw his license and he cannot then sell within municipal limits. I think that that would be a very effective step in reducing adulteration. Of course you have also got to see that they have sanitary stalls and that kind of thing. These safeguards are, I expect, provided in many of the municipal by-laws, but the commissioners will not enforce them.

65,899. The commissioners will not enforce them, not because they have not the will to do so, but because they have tried and failed, because the retailers try to conduct different shops in different names in different localities?—They ought to be registered in the same way as *gharriwallas*.

65,900. I want to know how the mere transfer of the dairies from the city limits to the country limits would be a relief?—You have got your controls, and the sheds are more likely to be in a good condition when removed to the country than if kept in the cities.

65,901. You are assuming that the adulteration takes place in the milking sheds and not in the streets in the hands of the retailers?—I do not suppose either of the persons concerned are likely to avoid any opportunity of adding a little water to their milk.

65,902. Adulteration may take place even by the road side, in the street, or anywhere?—Yes.

65,903. What about the economic effect of the price of milk being raised by this sort of legislation, as after all, the supply would be not quite ample? Supposing the price of milk goes up, are there many people in this country prepared to buy milk at the rate of, say, eight annas a *seer*?—That is the cost of milk in Calcutta; it is eight annas a pound for special grade bottled milk; you can also pay according to the

amount of water it contains. For fifty per cent of water, you may buy it at the rate of three *seers* a rupee.

65,904. Yes, those who want good, pure milk and can afford to pay for it will obtain it by this method?—Yes.

65,905. But, along with this method of legislation, is it not also desirable to increase the supply of good milk for the poorer classes, and yet keep the prices down to a point at which it would be within their means?—The only way in which you can do that is by removing the dairy sheds from the towns, because you must pay municipal and other taxes in the towns and there is also the increased cost of living and of footstuffs as compared with rates in the mofussil.

65,906. *Mr. Danby*: On page 120 of your note you say that the system by which the dispensaries are under the control of the district boards is satisfactory, inasmuch as it encourages the establishment of veterinary hospitals and dispensaries. Have you found that the district boards have established any new hospitals or dispensaries?—We have got six or eight new dispensaries sanctioned this year.

65,907. In North Bihar?—One in North Bihar and I think the rest in South Bihar.

65,908. You say that the members of the district boards are not interested in agriculture and will not sanction the necessary funds. This being the case, do you think it would be better if the dispensaries were placed under the control of the Veterinary Department?—I do not think so. I think the function of Government as regards veterinary relief is entirely preventive. As I pointed out in the note, you must have a certain number of officers in a district to carry out preventive work. There will be certain seasons in the year, or certain days in the week, when they will not be employed on that work. The only way in which you can occupy them is by putting them into a dispensary. Otherwise you would have 100 or 150 men wandering about the Province with nothing to do. I do not mean to say that the control should not remain with the department as regards inspection, but I think the function of Government is entirely preventive and the carrying out of research.

65,909. Do you consider that the Veterinary Assistants are under sufficient control under the present system?—No. I do not think we have got nearly enough high grade officers to control them. As I pointed out in my note, the object of Government should be to introduce the higher grade officers, one for each district, and to do away with the inspecting staff. That does not mean that the Inspectors at the present time are not doing their jobs efficiently. A man who has gone through a four-year course at the college and has had subsequent training should be placed in charge of the districts.

65,910. Under the present system, are the Veterinary Assistants transferred by the district boards or by the Veterinary Department?—By the Veterinary Department. They are really Government officers who have been lent to the district boards.

65,911. You say that the Legislative Council has approved the appointment of a Veterinary Assistant to each *thana* area. Would you recommend that a dispensary should be established in each *thana* area?—I think there is room for them when you consider that a *thana* may have nearly a hundred square miles.

65,912. *Sir Henry Lawrence*: How many would that mean for the whole Province?—I think about 480.

65,913. *Mr. Danby*: Although the Legislative Council has sanctioned the appointment of an Assistant to each *thana* area, the district boards have not sanctioned the funds to enable you to do so?—No. It has not been put up because, at the present time, it is an impossible proposition. The pay which the Assistants at the present time receive is not sufficient to attract the type of man that we want and that is a point which I should like the Commission to note. When a scheme for improvement of the pay of the subordinate officers is put up to Government explanations are asked for and these may run into pages on all conceivable aspects of the question. But the one thing which, to my mind, is overlooked or it is not accepted as an argument and operates against the Veterinary Department and the Agricultural Department and other out-door departments, is that the difference in pay between the clerical staff and the technical staff is not sufficient. The pay of the Veterinary Assistant is fifty rupees a month. The pay of the clerical staff here in Patna starts at forty rupees. Here the clerks have electric light and fans and other up to date conveniences. I do not blame the graduates for deciding for themselves which is really the more comfortable job. For instance, the other day I wanted a clerk on sixty rupees a month. I had applications from seven graduates, B.As. and B.Scs. I asked them why they did not go into the Veterinary Department and pointed out that they would start on fifty rupees and would get ten rupees duty allowance and a travelling allowance up to twenty-five rupees a month. They would not look at it because the conditions under which the Veterinary Assistants and the Agricultural Assistants work are such that no man who has any idea of his own comfort would ever accept.

65,914. *Sir Henry Lawrence*: What do you start your men on?—They start on Rs. 50 a month but I would start them on Rs. 75.

65,915. What do they rise to now, and what would you recommend?—They rise to Rs. 120. I think they ought to go up to Rs. 150.

65,916. *Mr. Danby*: With regard to the improvement of the breed of cattle in North Bihar, most of the cows that you say are valueless are kept by the cultivators for manuring their fields and not for milking purposes?—Yes, a good number.

65,917. It would require less to feed the improved type?—Yes, but you would not have so many to feed if you had an improved type.

65,918. That would not give them the manure?—The manure from ill-fed animals is of less value than that from animals which are properly fed. The whole question is simply one of reduction in the number of uneconomic animals, and I should say that fifty per cent of the animals are worth nothing but the price of the skin and bones.

65,919. In a thickly populated tract where there is no grazing area, how would you get over the difficulty of fodder for the cattle?—Many of the cattle that one finds even in the highly cultivated area could be got rid of and they could be replaced by a more economical type without any loss to the cultivator.

65,920. Would you recommend legislation to make inoculation compulsory?—Certainly.

65,921. *Sir Henry Lawrence*: Would you get the Pandits to support this policy? They gave me their *dastkhat* (signature) to the whole thing about seven years ago.

65,922. Does the *dastkhat* carry weight with the Legislative Council?—That is a question which I do not think I could answer. I do not know.

65,923. Have you any means of propagating this gospel among the gentlemen who hold the purse strings, I mean the Legislative Council?—They are pretty keen on the department as a whole. I do not think there will be any difficulty when they find that they are getting value for the expenditure.

65,924. You have hopes of carrying the Legislative Council with you?—Yes.

65,925. What is the average value you would put on animal, taking the useful and the useless together?—I should think about thirty rupees, taking the value of the good cattle in the three divisions and putting it against those in Orissa.

65,926. You have got over two crores of cattle?—We have nearly twenty-eight millions.

65,927. The money value of the cattle of the Province is thirty times that, or over eighty crores of rupees?—Yes.

65,928. Do you think it is worth while spending money to improve an asset of that character?—There is no doubt about that.

65,929. Your proposal is to keep up the value but reduce the number of cattle?—Yes.

65,930. Have you considered the point whether that reduced number would be sufficient to do the draught work of the Province?—I should think so. You will get better work out of larger bullocks than out of the things that are called plough bullocks at present.

65,931. You refer in your note to the work of Sir Arnold Theiler in South Africa. Do you consider that the measures adopted by him, for stamping out rinderpest in South Africa, could be effectively employed here?—Yes, under the conditions which I have already explained. I think the improvement of the livestock and the suppression of disease should go together.

65,932. Do you agree that rinderpest was stamped out in South Africa by Sir Arnold Theiler?—I think it was stamped out before he arrived in the country.

65,933. Do you know how long it took to stamp it out?—I think it took about eight or nine years.

65,934. Do you know that his view is that the rinderpest of India is a menace to the cattle of the whole world?—Yes; that is recognised in America. They will not admit cattle from India under any conditions whatever.

65,935. Or into South Africa?—I do not know about South Africa. But it is, in my opinion, a very serious blow to the livestock owner in this country, because if you can introduce Indian breeds or get the exportation increased, it means a very high value being placed on the better class of cattle.

65,936. So, this apprehension about the menace of rinderpest is a serious economic evil to India?—There is no doubt about it.

65,937. *Sir Thomas Middleton*: How many Veterinary Assistants have you at the present time?—The number is 137.

65,938. And you talked of 486 as being an impossible number?—Yes, for Government I do not think it is a feasible proposition.

65,939. When you say 'Government', do you mean Government and the district boards, or the Central Government?—Government and the district boards. I do not think that Government could pay for 486; but that is a question as to which side of the service it is intended to develop, the preventive side, or sporadic disease side.

65,940. Then even if you had this impossible number of Veterinary Surgeons, each man would have something like 100,000 cattle to look after?—Yes; but it would be impossible for the public funds to meet the cost of that number.

65,941. The point is that there is no possibility of providing, through public funds, a sufficient number of Veterinary Surgeons to deal with the cattle of the Province?—I do not think it is possible.

65,942. How many cattle should a Veterinary Inspector be expected to deal with? Obviously he cannot deal with 100,000?—I should think about 5,000 would be as much as he could possibly deal with.

65,943. That means that there is a very large scope for the veterinary practitioner in the country?—Yes.

65,944. Is there any hope for a private veterinary practitioner to make a living in India?—I do not think so. I have pointed out in my note that the Co-operative Department is the medium through which you can get help to the villagers.

65,945. Do you think that if the Co-operative Department were to take up the supply of veterinary advice, they could supply all the Veterinary Assistants that would be required to treat the cattle of the Province?—It would depend on the development of the Co-operative Department.

65,946. Have you any expectation that they could do so?—If we had the men available I believe we could send them out to a certain number of the banks, even at the present moment.

65,947. Everything points to your endeavouring to get as many men as possible?—Yes.

65,948. Very naturally, in starting a new college, you think of a four-year course; that is the course adopted in Europe and in veterinary colleges in other parts of this country. But do you not think that there is something to be said for a three-year course in circumstances like yours?—Yes, so long as you can get the men in later for 'refresher' courses.

65,949. That is a possibility always?—But it would not get over the difficulty of providing accommodation for the men and it would increase the number of classes.

65,950. 'Refresher' courses are easily arranged so as not to interfere with the normal working of the college. Would that not be possible?—It is my intention to have the 'refresher' course under any conditions, because I think the men will benefit a lot more by their experience outside, and then, bringing them in and putting them through these courses, they will know where their shortcomings are, in what subjects they require brushing up; in that way, I think, the course is very necessary and will undoubtedly benefit them.

65,951. The standard of the veterinary curriculum which one finds in the colleges in England, for example, is devised to meet the needs of men who are going in for many types of veterinary practice. Some, as you have indicated, might be practising in South Kensington and dealing with dogs, others might be at Newmarket treating horses; others may be country veterinary practitioners dealing chiefly with cattle. If you were devising a curriculum for Bihar you would have to think almost entirely of the treatment of cattle?—Yes, horses are out of the question in this Province.

65,952. You might put dogs out of the question too?—Yes, but sometimes one has to treat dogs as well, in order to please one's clients.

65,953. But you might concentrate on a curriculum for the practitioner who might be described as a "cattle doctor". What I want to know is whether, in framing the curriculum for your new college, you have had this in mind?—Yes, except in regard to the teaching of anatomy which requires to be revised. The study of anatomy is carried out on the horse. Considerable waste of time takes place in the veterinary colleges, because the students do not carry out their dissections on the ox. They spend, say, six months or seven months in dissecting the horse and then they switch off and learn comparative anatomy. What is learnt in this way is not sufficient for the ordinary student, because his knowledge of English and Latin is very limited and when he is taken from the study of the horse and put on to the ox, valuable time which could be put to better advantage on the study of the ox is wasted.

65,954. I quite agree with you. You would agree with me, I presume, that there is very much to be said for aiming at a three-year course, mainly devoted to diseases of the ox, for the purposes of the Indian practitioner?—In this Province, certainly, the horse is out of the question. For example, we have a very large fair at Sonepur on the other side of the Ganges about six miles from here, at which in 1913 before the War, one could be quite certain of getting a useful type of country-bred. But now one will find nothing but weeds from the Punjab mostly with an English T. B. cross and small ponies which can only be used for *tum-tums*.

65,955. Are you seriously hampered in teaching here by the absence of text-books written for India?—As a matter of fact I intended writing to Dr. Bradley of the Edinburgh Veterinary College about the preparation of a text-book on the anatomy of the ox for the use of the students; but other text-books are, I think, quite good enough for the students; they can be supplemented by notes.

65,956. Now coming to the question of simultaneous inoculation: I think in reply to the Chairman you indicated that in your view the best method by which to proceed was the method of selection; that is to say, you would select certain animals in a district and inoculate them?—Yes, in the areas which are declared to be breeding areas.

65,957. This means that you would have to inoculate each fresh crop of calves and that, within a district, inoculation has got to be continuous?—That is one of the things which, I think, the people who advocate this system appear to forget. You have got to constantly go round the villages doing inoculation, and that is one of the reasons why the control of the disease should be simultaneously taken up throughout India. There is no other way of dealing with it. Any Province that takes up this question independently is simply throwing away its money.

65,958. But if you had each crop of calves protected then it would not matter if there was an outbreak in the neighbourhood?—No, but the menace is always around.

65,959. I think you had in mind chiefly the breeding animals when you were talking about selection for inoculation?—No, not breeding animals only; I meant all the animals inside a tract which has been declared to be suitable for cattle breeding, because all tracts in the Province are not suitable.

65,960. But inside that declared tract would you inoculate every animal, or only the best animals?—Every animal that was considered to be worth inoculating.

65,961. You would gather all the useful plough cattle and inoculate them, but you would leave the others alone?—Yes, I would do that, but if the people saw the benefit of it I would inoculate some of these

other cattle as well. I would introduce this system, to start with, in the cattle breeding tracts.

65,962. Are these cattle-breeding tracts in Bihar well defined?—Yes. Wherever you get good *rabi* crops you get good cattle. For instance in Orissa, Chota Nagpur and Bengal, where the *rabi* does not count, the quality of the cattle is bad.

65,963. The ordinary cultivator in this Province seems to go in for cattle-breeding to a much greater extent than is common in the rest of India?—He has got a market in Bengal which is constant. The death rate of cattle in Bengal is enormous. I was in Bengal, at least in the two western divisions, before this Province was formed, and it was an ordinary experience to see, during the rains of early winter, lines of cattle up to their bellies in water feeding out of dug-outs, small boats which the people in villages ordinarily use. They are made from the excavated trunk of the palm tree.

65,964. As a rule in other parts of India, when there are not enough cattle bred within a district the supply comes from grazing districts, from the stock of wandering herdsmen?—Yes.

65,965. But, as you have explained to us, the supply for Bengal comes largely from the cultivated tracts of Bihar?—Yes, and from the Terai and Nepal, just outside the borders of North Bihar. In the northern part of the Bhagalpur, Purnea and Champaran districts, cattle are taken to the grazing grounds in Nepal, and at certain times in the year these are brought back and the young stock are sold to the cultivators, who rear them for twelve months or two years as the case may be. (They generally take one year's cultivation out of them.) These are then sold to the dealers who distribute them all over the Province or take them to Bengal and Assam. Many of the dealers come down to the Shahabad district, for rearing.

65,966. You are strongly in favour of increasing the milk trade of the Province, and you give your reasons. Would you propose to draw milk from the areas that breed cattle?—Yes. It would not be possible from the grazing areas. In my note I mention, as a market, the industrial areas to the south, that is Calcutta, the coal fields, Asansol, and as far as Jamshedpur.

65,967. I wanted to be quite clear on that. I did not know whether you proposed to draw milk from the areas which now supply draught cattle?—Well, good draught cattle are bred in Shahabad, which is covered by the Son Canals and also from parts of the Patna district. I would get milk there principally.

65,968. Would not the introduction of a milk selling industry destroy the cattle breeding industry?—I do not think so.

65,969. What would happen to the calves?—You will still have to supply the bullocks.

65,970. That is not the experience of cattle-breeders in other countries, for example, the dairy districts of Ireland?—No, because they do not work the calves; they export them to England and Scotland; but here you have a definite use for the bullocks, that is, for ploughing and carting.

65,971. If you have a market for milk, the calves would be starved?—No; I do not think so. For instance, here in the Shahabad district they export all their cows to Calcutta, or as many as they can spare, and yet the calves are in excellent condition.

65,972. You draw attention to the great drain on the good cows of India because of slaughter when they go dry in town dairies. Do you think any measures can be taken to prevent this?—There is no feasible

method except the one that I have indicated, that is taking the town dairies out into the mofussil, where the conditions are suitable for keeping cattle cheaply.

65,973. Would it not be possible to put good cows on a register and prevent them being slaughtered except under a license?—I do not think even that will be possible, because, what are you to do with dry cows that are not brought for slaughter? They have got to be fed, and it would not pay to keep such cows in Calcutta.

65,974. The cost of transport would increase the cost of milk to the consumer; he must pay for it?—It is the only feasible way; in my opinion it is quite practicable, because we have the experience gained in transporting milk from Ahmedabad to Bombay, from Jubbulpore to Bombay, and from Karnal to Calcutta.

65,975. *Sir Henry Lawrence*: Is not the evil of slaughter of cattle common to all great cities?—It is not so in England and Scotland.

65,976. Is it anywhere greater than in Edinburgh at present?—That is only a question for the corporation to deal with properly.

65,977. *Sir Thomas Middleton*: You suggest that they ought to take up the question of the digestibility of fodders, at Muktesar. Are you aware that this work is being done in Bangalore?—The conditions in Bangalore and Muktesar are different. I do not think that enough work is being done on that subject.

65,978. Your argument is that there should be more investigation?—Yes.

65,979. *Mr. Calvert*: You mention that some of your staff would not use the Burdizzo instrument?—Yes. We tried gentle persuasion to start with, but they would not use it; but after dealing with that question departmentally we have got over that difficulty.

65,980. They took to it without objections?—Yes; but I do not think they are convinced, as yet, that they are doing quite the right thing. In connection with that question, I had a member of the Council come to me (a very well educated person) and ask me whether I could not drop the question of castration of cattle. That is impossible of course.

65,981. What is the size of the four farms that you have in contemplation for breeding cattle?—They ought to be about 600 acres each.

65,982. What is the number of bulls which you contemplate turning out every year when they have reached their full capacity?—Here in Patna I have asked for 200 cows, but we will really be able to work up to nearly 300 cows. I think we will get about 100 to 150 bulls a year. That would be a generous estimate to start with.

65,983. Will the outturn of these four farms in full working order be sufficient for the needs of the Province?—No.

65,984. *Dr. Hyder*: You are not satisfied with the system of State scholarships; are you?—No.

65,985. Does your dissatisfaction arise on account of the method of selection, or the training, or is it due to the fact that you have got to guarantee a post, here, to the candidate who is trained in England?—That is at the bottom of the whole thing. We have not enough graduates to select from, and that is the chief reason which operates against this system being of much use. We have an insufficient number from which to select the men; we have selected these men and they go out for training with the understanding, more or less, that they will be taken on.

65,986. If, in the first instance, you get a large number to choose from, and, secondly you take away the guarantee, would that remove your objection?—No, because it is very different with Indians as compared with Europeans. Even with a selected Indian, one has not the same guarantee that he is going to be the kind of officer one would like to employ as in the case with an European. He does not take up the profession (at least that is my experience) with the intention of doing the job well; he takes it up merely as a living.

65,987. The position is this: You choose well; you exercise control as regards the training in England; you choose also the University and the kind of training that he should receive; and before taking him on in your department you also look into his qualifications, that is to say, you do not guarantee a post for him; would such a system of State scholarships do?—The one advantage to the country is that we will be supplying more veterinary surgeons whether they are good or bad. My contention is that the men whom we are getting at present are not up to the standard that we require for the reason that many of them go into the department mainly with the object of getting a living and not with any interest in the work.

65,988. How many State scholars have you had?—We have only had two; one is at present employed and the other is at Home.

65,989. What would you say about sending out the men who are already in your department?—Well, the training at Muktesar (I had an opportunity of attending the lectures and demonstrations), as regards the diseases which are met with in India, could not be given anywhere in Europe, and I do not think the quality of the teaching in Europe would be any better than we get at Muktesar.

65,990. You would prefer recruiting from Muktesar, if training could be given there?—Training in England is essential but we must get them to the dairy districts. The practical work of cattle-feeding, breeding and improvement, the control of disease and the general hygiene of the farm animals will not be obtained here, so readily.

65,991. You choose your University graduate well, and give him training there and give him training in some of the areas which you suggest. If that is done, you will not find fault with the training he receives in England?—No; but whatever training he receives in England would have to be supplemented by a course at Muktesar; that is essential.

65,992. As a responsible officer, you would suggest that if a man receives his training in England he should also receive six to eight months training at Muktesar. Is that your view?—That is absolutely essential.

65,993. As regards preventive inoculation I find from your report that you send your men to inoculate the cattle at a time when the cattle are required by the cultivators. Can you not find any other time?—It depends on when the disease breaks out.

65,994. *The Raja of Parlakimedi*: Inoculation for rinderpest you can do only in the cold weather?—We inoculate whenever the disease is reported.

65,995. *Dr. Hyder*: What is the total number of castrations that your department has carried out?—Very few up to the present. I could not tell you the number exactly.

65,996. I was looking at these figures, and I find that the number is very small?—It is; that was entirely due to prejudice, but I have

now been giving demonstrations to the villagers through the co-operative societies wherever they exist, and the Inspectors carry on demonstrations in the villages as well.

65,997. Do you keep the signatures which you have obtained from the learned Pandits in safe custody?—I have got the records, and their names are down on the printed circular.

65,998. *Babu A. P. Varma*: Supposing we had a sufficient area of grazing grounds, do you think the cattle in our parts could be kept in good condition without stall feeding?—Grazing grounds are of no benefit whatever to the cattle population.

65,999. You know that in North Champaran, and near the hilly tracts generally, we have the cattle in good condition although they are not stall fed but are only grazed on grazing grounds near the jungles, on *rakhants*?—Yes, but the point is that your cattle are economic under those conditions. The only reason that you have grazing grounds is because you will not get cultivators to take up the waste lands. If you can get cultivators to plough that land you will get more monetary benefit out of it through letting it at so much a *bigha*, but if you keep cattle on it you are really using those cattle just because you cannot cultivate. Under those conditions, the cattle are of no benefit except for the calves which they produce. You get practically no milk from the cows.

66,000. When you made your statement about stall feeding, did you have the district of Champaran in your mind?—No, but North Bihar in general.

66,001. If you could leave some area in every village for grazing co-operatively, would that be sufficient for the plough bullocks?—You would get no grazing between December and the 1st of July.

66,002. These areas would be available only for a small period, say for six months from the time the rains set in?—Yes, but for the remaining six months it would be only exercising ground. The ground that you would set aside would give you more fodder if you manured it and grew a *bajra* or *janera* or *makai* crop. You would get up to 300 *maunds* an acre of *makai*, and about the same from *bajra* and *janera*.

66,003. What I was going to point out was that when the rains set in we have the *rakhants*, as you know, and so long as the cultivation lasts the cattle live by grazing in these *rakhants;* after that when we have the *rabi* we get the *bhusa*?—Yes.

66,004. In that way, I have seen that the cattle can be kept up for a long time. What is the good of stall feeding the bullocks?—You cannot get good work out of bullocks unless you feed them properly. You will not be able to work your bullocks for rice cultivation, when they are turned on to heavy work, up to their knees in water and puddle, if you feed them only on grass.

66,005. On page 120 of your note, you indicate certain drawbacks in your staff, and you say that on account of these drawbacks your department suffers in repute. In that case, do you not think that the indifference of the members of the district boards that you mention here can be attributed to the drawbacks of the staff more than to ignorance of what can be achieved by extra staff?—I think the two things operate. You have members, in many cases, who do not recognise the advantages of using Veterinary Assistants for the treatment of their cattle.

66,006. The members know the use of cattle, and they require their services. So they would naturally like their cattle to be kept in good condition, and for that reason they would naturally support the Veterinary Department?—Yes. But another thing is that it is difficult for officers to get into touch with the members of the district boards. It is very difficult to explain to the members what is really required.

66,007. Therefore they do not appreciate the value of it?—Yes. Most of our work has to be done through correspondence, and that is very often difficult; it is very difficult to convince the members in this way. Personal interviews and attendance at meetings are more likely to be effective.

66,008. Does this apply to the members who have come in after the Reforms, or does it refer to the old members who were nominated before the Reforms?—It is a little bit of both.

66,009. You say that these members have no interest in agriculture. What else do they depend upon for their livelihood?—You might be an exception.

66,010. Generally, most of the elected members whom I have known of late years are entirely dependent on agriculture for their livelihood?—They may depend on agriculture, but their practical help is what is required. There are very few zamindars that I know of, in this Province, who take an interest in agriculture.

66,011. It is not the zamindars alone who are members of the district boards. We have as members mostly people who are agriculturists and who depend entirely on agriculture for their livelihood. They are not the big zamindars, but the small people who have to depend on cultivation. I wanted to bring to your notice that most of the members certainly to take an interest in agriculture?—I am very grateful to you for bringing it to my notice.

66,012. *The Raja of Parlakimedi*: You have remarked in your note that district boards are not very sympathetic towards the veterinary hospitals and dispensaries. What is unpopular? Is it the hospital or the dispensary?—They will not go to the expense of putting up buildings and that kind of thing. Hired houses which very often cost ten to fifteen rupees a month are used for dispensaries, and that, in my opinion, is a waste of money. We want buildings where they can treat animals. The rented houses are very often in a congested part of a town or village, and they are quite unsuitable for the work to be done. But apart from those questions, I cannot say that the district boards at present are very adverse to taking the men. As I said before, seven or eight new appointments have been made this year.

66,013. At any rate, things would have been better if the cultivators' side was better represented in the district boards? Is it so?—Yes.

66,014. In this Province, is there not a rule to the effect that representation for the backward classes should be by nomination?—Yes, I believe so, but I am not sure about the point. I think it would help the department if an officer, say an Inspector or higher grade officer, was appointed ex-officio to the district board, in order that he may represent our case and enlighten the board on matters connected with the department.

66,015. At least, through nomination the ryots are represented on the district boards?—Yes.

66,016. As regards cattle-breeding, why is it not more largely taken up in this Province, when such a number of cattle are being exported every year to other Provinces?—I first put up a scheme to Government

in 1909 for a cattle-breeding farm in Shahabad, and the scheme was laughed at. They simply put it aside as a ridiculous proposition.

66,017. Did they give any reason?—They said it was not needed, and again that it was too expensive. I reduced the cost of the scheme in order to get it started, but they would not look at it. In the note here, take for instance the scheme for two to three farms that I recommend, one in Shahabad, another to the north of the Ganges and the third at Cuttack. I put them up in 1919. Before that, I think in 1918, I put up another scheme for taking over a very large area of land in the Champaran district, belonging to one of the factories. I think the area was 2,000 acres, but Government put the scheme aside.

66,018. How many farms would you suggest for the Province?—I think there should be one in Shahabad, one north of the Ganges, and one in Cuttack. We can use these farms as *foci* for the improvement of the breed. From the improved heifer and bull calves in that area we can get all that we require in the way of young stock for improvement in other parts of the Province. In this way, inside of ten years, it will be found that a considerable number of villages are using animals that are the progeny of bulls bred on the farm.

66,019. What would be the annual recurring expenditure and what would be the initial expenditure?—I have not worked out the scheme but the initial expenditure would be something like two-and-a-half lakhs for plant and buildings *plus* the cost of land acquisition.

66,020. What would the recurring charges be?—I should think about half a lakh. My object in putting the farms in these areas is that as we want to introduce dual purpose cattle, we must provide the cattle owners with the means of taking away the milk. At several stations along the East Indian Railway we intend having pasteurising plant to prepare the milk for transport to the markets. The breeding of the improved and pedigree cattle should be in the hands of the Government. The distribution of the bulls and the collection of milk should be in the hands of the Co-operative Department, and the Co-operative Department should have an expert at each milking station in order to see that the work is carried out properly.

66,021. Do you have a ready market for the working animals?—Yes, in Bengal, Assam and Chota Nagpur. Cattle from here go down to Jamshedpur. All the cart bullocks on the Chota Nagpur plateau are purchased from this Province, in the Sonepur fair and some other fairs in Bihar.

66,022. To insure proper veterinary aid to the cultivators, how many dispensaries and hospitals would be required for the Province?—I could not give you a definite answer. One in each *thana* would not cover the number that is required.

66,023. Do you have sufficient staff to popularise veterinary science among the cultivators?—No.

66,024. Would you be able to do this if you had more staff?—Yes, it could be done.

66,025. Do you think that the work done by the existing staff is satisfactory?—Certainly. The work would be very much better if the Assistants and even the superior staff did not have to waste so much time in getting from one place to another. That is where a lot of trouble comes in; for example, if I want to go to Muzaffarpur or to Champaran, it means a whole day wasted in going there and another day in coming back.

66,026. On page 124, you say: "Conditions will then arise in which young and inexperienced Indian officers will be placed in charge of

the provincial departments without having any one in professional authority to whom they can turn for advice." Is that because the training they get is not sufficient?—They will be young and inexperienced and the cultivator is the person who is going to suffer from their inexperience. I think the Government of India did not take that into consideration when the Lee Commission issued its report. The cultivator has been absolutely ignored in the last seven or eight years. His interests have been absolutely set aside.

66,027. But as regards experience, you think there will be nothing wanting in the Indian officers?—As I have already said, the cultivator is the person who counts in all these questions. It does not matter whether the officer is European or Indian. The interests of the cultivator are, in my opinion, paramount.

66,028. *Professor Gangulee*: How much serum do you get from the Muktesar Institute every year?—It is given in the report. I think you will find it in my notes.

66,029. *Sir Thomas Middleton*: At what age do cultivators usually carry out castration in the Province?—It ranges from twelve months to two years. It is very seldom done under twelve months.

66,030. Castration after two years is not very frequent?—Not very frequent except in the large grazing tracts, and the reason in that case is the difficulty of bringing in the cattle for castration.

66,031. From the point of view of developing a good plough bullock, what would you consider the best age?—The younger the better. From nine to twelve months is, I think, suitable. If it can be done earlier, so much the better. There is a prejudice against the castration of animals younger than twelve months because it is said the hump will not develop.

66,032. *The Chairman*: Is there any truth in the idea that the hump is a secondary sexual characteristic?—Yes.

66,033. *Sir Thomas Middleton*: You have already told us that Muktesar would provide for research on Indian diseases better than any European institution. Could you not use, say, Hissar, or Karnal, for giving a training in animal husbandry so that you might be self-contained in your requirements for training students?—I should think it would be so if the Government of India would take a broader view of the question of veterinary research than they have done for the last eight or nine years. Every effort of the Veterinary Department to get some sort of recognition or to get an increase in staff has been turned down. Even within the last week, the Director of the Muktesar Institute has addressed the Government of India on the question of a Veterinary Conference, as there are certain urgent questions connected with rinderpest and other diseases which he thought should be brought to the notice of veterinary officers personally. The proposal was turned down for no other reason than that this Commission was sitting and that they would probably make some recommendations.

(*The witness withdrew.*)

APPENDIX I.

Statement showing the number of cattle inoculated during the last five years and the cost of sera and vaccines.

Year.	Name of disease against which inoculation was carried out.	Names of sera and vaccines.	Number of animals inoculated.	Cost of serum or vaccine.	Remarks.
1	2	3	4	5	6
				Rs. a.	
1922-23	Rinderpest .	Anti-rinderpest serum.	113,190	85,937 8	
	Hæmorrhagic Septicæmia .	Hæmorrhagic Septicæmia serum.	42,729	25,500 0	
	Anthrax .	Anti-anthrax serum.	1,206	375 0	
	Black Quarter .	Black Quarter vaccine.	2,200	2 13	
		Total .	159,325	111,815 5	
1923-24	Rinderpest .	Anti-rinderpest serum.	107,681	79,687 8	
	Hæmorrhagic Septicæmia.	Hæmorrhagic Septicæmia serum.	33,937	15,000 0	
	Do. . .	Do. vaccine .	54	187 8	
	Anthrax .	Anti-anthrax serum.	1,461	750 0	
	Black Quarter .	Black Quarter vaccine.	2,460	387 3	
		Total .	145,593	96,012 3	
1924-25	Rinderpest .	Anti-rinderpest serum	106,368	58,687 8	
	Hæmorrhagic Septicæmia.	Hæmorrhagic Septicæmia serum.	51,471	28,500 0	
	Do. . .	Do. vaccine .	1,041	693 12	
	Anthrax .	Anti-anthrax serum.	1,174	1,875 0	
	Black Quarter.	Black Quarter vaccine.	203	796 14	
		Total .	160,257	90,553 2	

APPENDIX I—*contd.*

Statement showing the number of cattle inoculated during the last five years and the cost of sera and vaccines—*contd.*

Year.	Name of disease against which inoculation was carried out.	Names of sera and vaccines.	Number of animals inoculated.	Cost of serum or vaccine.	Remarks.
1		3	4	5	6
				Rs. a.	
1925-26	Rinderpest .	Anti-rinderpest serum	107,541	68,437 8	
	Hæmorrhagic Septicæmia.	Hæmorrhagic Septicæmia serum.	54,806	5,125 0	
	Do. . .	Do. vaccine .	4,927	2,437 8	
	Anthrax. .	Anti-anthrax serum.	1,967	1,500 0	
	Black Quarter.	Black Quarter vaccine.	912		
		Total .	170,153	97,713 4	
		Cost of pint bottles and boxes.	..	3,318 6	
				101,031 10	
1926-27	Rinderpest .	Anti-rinderpest serum	62,280	41,250 0	
	Hæmorrhagic Septicæmia.	Hæmorrhagic Septicæmia serum.	74,958	31,500 0	
	Do. . .	Do. vaccine .	3,875	2,437 8	
	Anthrax .	Anti-anthrax serum.	3,367	2,625 0	
	Black Quarter .	Black Quarter vaccine and serum.	3,251	585 15	
		Total .	147,731	78,398 7	
		Cost of pint bottles and boxes.	..	3,621 15	
				82,020 6	

APPENDIX II.

Statement showing seizures and deaths of cattle from the principal contagious diseases as reported during the last five years.

Year.	Rinderpest.		Foot and Mouth disease.		Hæmorrhagic Septicæmia.		Black Quarter.		Anthrax.		Total.	
	Seizures.	Deaths.	Seizures.	Deaths.	Seizures.	Deaths.	Seizures.	Deaths.	Seizures.	Deaths.	Seizures.	Deaths.
1	2	3	4	5	6	7	8	9	10	11	12	13
1922-23 . .	54,617	22,365	75,224	480	10,092	7,444	105	98	219	138	1,40,257	30,525
1923-24 . .	37,642	14,574	78,433	875	6,463	4,820	212	176	146	99	1,22,896	20,544
1924-25 . .	34,193	13,473	78,725	570	7,911	5,915	97	81	140	117	1,21,066	20,156
1925-26 . .	27,359	10,384	82,459	501	6,723	4,988	155	127	176	125	1,16,872	16,125
1926-27 . .	12,626	4,674	93,739	299	5,182	3,706	119	116	252	111	1,11,918	8,906
TOTAL .	1,66,437	65,470	4,08,580	2,725	36,371	26,873	688	598	933	590	6,13,009	96,256

Rai Bahadur DURGA PRASAD, M.A., Registrar of Co-operative Societies, Bihar and Orissa.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—(x) I consider this to be one of the most important problems for this Province, as it abounds in middle-class families possessed of landed interests who are neglecting agriculture in quest of clerical employment which assures a fixed monthly income. It is the abandonment of the pursuit of agriculture that is responsible for a good deal of unemployment amongst the middle classes. I am decidedly of opinion that a solution of the problem of middle-class unemployment is to draft the middle-class youth to agriculture. Two questions arise.

The first is whether the middle-class youths would care to take to agriculture and the second is whether it can be made paying for him On the first question I would say that a great change is noticeable in the angle of vision of the middle class. If an agricultural life can be made paying, there would be no dearth of young men to take to it. I have met and discussed this question with a good many young men and have been surprised to find greater alacrity and response than I expected.

If we establish agricultural colonies and give a young man a farm of ten to twenty acres to be worked up under improved methods, partly with his own capital and partly with borrowed capital, he should be able to stand on his own legs in five to eight years' time. The successful establishment of such a colony will be a great eye-opener to the unemployed young men and will lead to far-reaching results. But the execution of this idea postulates the following:—

(1) Provision of means of agricultural education.

(2) Provision of an organisation to raise funds and control and regulate the colonies.

As regards the first postulate, it will be for Government to supply it. Every district, in my opinion, should have an agricultural school. As regards the second postulate, the Co-operative Department can take up the work with the help of leading and wealthy citizens and a subsidy from Government. For instance, a central co-operative society may be formed on a share basis, consisting of persons interested in the question of the solution of the problem of unemployment among the middle classes, who are prepared to undertake a certain amount of financial responsibility. Such a society, if formed with a share capital of, say, one lakh of rupees, would be able to raise the finances needed to run the colonies. For the purpose of administering the colonies, branches may be established in every district where such a colony springs up. The capital required by the farmer to set himself up will vary but may be put down at an average of Rs. 5,000 for a farm of twenty acres. With mixed farming the farm ought to yield at least Rs. 2,000 per annum after three to five years. From this income the farmer should be able to amortise the capital cost in another three to five years, that is to say, at the end of six to ten years he will have for himself a farm, the permanent income of which will be at least Rs. 2,000. In order to make the scheme a success, it would be necessary for the society to entertain a staff including some agricultural experts. It is in this, as well as in obtaining lands in Court of Wards and Government estates, that Government help will be required

My answer to Question 2 (x) is, therefore, that the ways by which agriculture can be made attractive to middle-class youths are :—

(1) Establishment of agricultural schools, and

(2) Establishment of agricultural colonies.

(xii) I think the cheapest agency for popularising adult education in rural tracts would be co-operative societies. If, as should be the case, each village has at least one co-operative society and the district board will give a small grant to the society to undertake adult education, the society can open a night school which will be to the advantage of both education and co-operation. We have attempted through our co-operative societies in certain areas to remove illiteracy among the members and we have met with a certain amount of success. The question of adult education is, however, a difficult proposition, as, generally speaking, it is a very up-hill task to persuade the grown-up villagers to learn the three R's like their own children.

(xiii) In my answer to Question 2 (x), I have suggested the establishment of agricultural schools. The administration of such schools should be entrusted to managing committees which should include representatives from (1) district boards, (2) Agriculture and Co-operative departments, and (3) the peasant class. As regards the finance of these schools, there is no reason why district boards should not substantially contribute.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) In this Province co-operative institutions have played a great part in the inculcation of the practice of improved agricultural methods. Mere advertisement, whether by leaflets or by lectures, is of little avail as it produces only a temporary effect. What is required is a sympathetic guide fully acquainted with the *pros* and *cons* of the recommended practice, who will sit in the village and do all that is possible to induce the villagers to take it up. The task can, therefore, be successfully performed either by an officer of the Agricultural Department or of the Co-operative Department, if there is a society in the village. Honorary workers can also give help in this direction. It is of the greatest importance that there should be a well-laid-out and systematic programme for the introduction of agricultural improvements; for each defined area there should be a definite programme with functions separately assigned to the different officers and honorary workers and the programme should be strictly followed. It is then that tangible results will be achieved.

Our societies have done good work in the propagation of the cultivation of (*a*) groundnut, (*b*) Coimbatore sugarcane, (*c*) Dahia paddy, (*d*) Darjeeling potato, (*e*) Pusa wheat, and in the use of manures.

(*b*) and (*c*) In order to bring home fully to cultivators the results of demonstrations, the demonstrations should be completely carried out in the village itself. The villagers have little faith in demonstrations carried on elsewhere; they want to see the demonstrations in the soil of their own village before they can make up their mind to take it up. It is, in my opinion, not much worth while maintaining several big demonstration farms. Instead, it would be better to have, in each subdivision, a staff ready to go out and carry on the demonstrations in villages where the ground has been prepared. With such a staff available on the spot, our Central Banks would have little difficulty in widely promulgating agricultural improvements through the societies. I would, therefore, advocate the employment of a staff by the Agricultural Department in each subdivision to work in collaboration with the Central Bank to carry on the work of demonstration and propaganda.

Rai Bahadur Durga Prasad.

QUESTION 4.—ADMINISTRATION.—(*c*) (iii) One of the standing grievances in rural areas is the utter neglect of village roads on the part of the district boards. Even big villages and marts are devoid of good roads capable of traffic throughout the year. The want of proper roads in the villages is a great handicap and district boards should be made to remove it.

QUESTION 5.—FINANCE.—(*a*) The co-operative movement, in my opinion, is the best method of tackling the question of agricultural finance. If the movement is fully organised and equipped there should be no difficulty as regards agricultural credit. The co-operative movement as built up in this Province can undertake the task of meeting the credit requirements of cultivators, both for short and long terms, but a large augmentation of the staff is necessary not only for an extension of the movement but also for its regulation on sound lines. We have now got 205,825 members in 7,614 primary agricultural societies; that is to say, we have in our fold only about three-and-a-half per cent of the agricultural families of the Province (taking one person to represent a family of five). This has been accomplished in fifteen years. The goal of better financing of agricultural operations cannot be reached unless the following are provided:—

(1) Rapid extension of the movement by employment of adequate staff, so that each village may have one society in a measurable distance of time.

(2) Reduction in the rate of interest to borrowers from co-operative societies, so that, the maximum interest does not exceed eight to nine per cent.

I attach great importance to No. 2. It is futile to talk of better financing of agricultural operations if money has to be raised by the cultivators at Rs. 15-10 per cent, which is the rate at present being levied by societies in this Province. Of course, too facile credit has to be guarded against. But it is a mistake to think that it is guarded by levying a high rate of interest. There are other means of guarding instead of charging uneconomic rates of interest. The sole criterion is, is it possible for the cultivators, steeped in debt as they are, to make agriculture pay if they have to raise money at Rs. 15-10 per cent? In my opinion, unless the rate of interest is materially reduced, there is no hope of better agricultural finance.

It is said that, without land mortgage banks, the long term credit requirements of the cultivators cannot be adequately met. My experience of the conditions of this Province is that the establishment of land mortgage banks is not needed and that co-operative credit societies are quite sufficient to meet in full the short and long term credit requirements of the cultivators. Land mortgage banks may be necessary for zamindars but they are not necessary for cultivators whose needs can be fully catered for by primary co-operative societies. What is required is that credit societies should issue long term loans to meet the requirements of cultivators, and this can be arranged.

With wider extension of the co-operative movement it will not be necessary for the Government to advance any *taccavi* as all rural financial requirements will be met by the co-operative societies. The actual distribution of *taccavi* by any one who is not a responsible Government officer should be strictly prohibited and the cultivators should not be made to wait for days and days before they get the advance.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) The main causes of agricultural indebtedness are:—(1) the pressure of the population on the soil, (2) the prevalence of usury, (3) litigation, and (4) cattle mortality. There are other minor causes but, in my opinion, they do not

count for much. Litigation has become the greatest curse of Bihar and it is not at all uncommon to find small cultivators spending much more than the value of their property in fighting for it. There is heavy cattle mortality in the Province and as much as fifteen per cent of the loans given out by the co-operative societies is taken for the purchase of cattle. The co-operative movement is tackling usury but the monster is still alive, particularly in villages where societies have not yet come into existence. In order to kill the monster the following steps are necessary:—

(*a*) Wider extension of the co-operative movement.

(*b*) Complete liquidation of old debts, if any, of the members of co-operative societies.

As regards the most potent cause of indebtedness, which is the pressure of the population on the soil, agricultural reforms will undoubtedly improve the situation but will not afford a complete solution, unless they are accompanied by provision for subsidiary occupations to eke out the profits from agriculture.

(ii) A source of credit is the moneylender, including in the term landlords, a good number of whom carry on the work of lending in cash and in grain. Another source of credit, since the inauguration of the co-operative movement, is the co-operative societies. The grain loans which are generally given out by the landlord on the *sawai* system (for one *seer*, one-and-a-quarter *seer* is repayable) are very much to the benefit of the agricultural economy of the village. In the first place, the borrower fully understands what and when he has got to pay; secondly, he has not got to convert his grain into cash; he meets the loans out of the produce just as he eats out of it. In several parts of this Province grain *golas* established by the Co-operative Department are working with success. In my opinion, grain loans should be encouraged in preference to cash loans as much as possible. In addition to the village moneylender (who is generally not particularly dishonest or exorbitantly usurious) there are in this Province a number of Punjabis carrying on moneylending in a relentless manner and also some organised moneylenders who have got regular loan offices called *kist kothis*.

(iii) The main reason preventing repayment is that default has become traditional in this country and the borrower thinks he cannot entirely free himself from debt. A borrower never makes any effort to pay off unless he is compelled to do so. A Punjabi moneylender and a *kist kothiwala* succeed better, as their demands are insistent and cannot be ignored; this explains the reason why recoveries in co-operative societies are not so good as they ought to be. The feeling here seems to be that, if a man is born with debt, why should not he die in debt? The greatest task before the co-operative societies for the present is to enforce punctual repayment by improving their methods, *e.g.*, by liquidating previous debts, fixing suitable terms of repayment and enforcing payment on the due dates.

(*b*) and (*c*) Only by the extension of genuine co-operative societies can the burden of debt be lightened.

No special measures would, in my opinion, be of any great use. Through the societies people have to be taught to help themselves and reform themselves; extraneous remedies are mere palliatives and I would not, therefore, advocate their adoption.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) Consolidation of holdings through village co-operation seems to be the only feasible method of tackling the evil resulting from the excessive subdivision of holdings. In this Province there is no keen desire so far among the

cultivators themselves for a readjustment of their holdings to make them more compact; but if things are properly explained and a regular campaign started, it is probable that a desire will spring up. In order to popularise consolidation, the best method, in my opinion, would be to persuade the members of a co-operative society to undertake joint farming for a few years and then to decide about consolidation on the results of joint farming; that is to say, we have first to demonstrate to the cultivators the benefits from consolidation before we can hope to create a desire for it.

(*b*) The obstacles in the way of consolidation are:—

(1) Existence of numerous landlords in a village.

(2) Hostility of landlords.

(3) Conservatism of cultivators.

(4) Existence of different classes of land in the village.

(5) Legal difficulties.

Numbers (1), (2) and (5) can be met by legislation. Number (3) which seems the most insurmountable of all obstacles can only be worn off by the pressure of a co-operative society. A society has power to expel a member who does not conform to its resolution. For No. 4, joint farming, as suggested above, would be a good solution.

(*c*) I do not consider any legislation to be called for.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) Generally speaking, cultivators are employed for eight months in the year. The off-season falls in the hot weather from April to June, (this is the time when marriages are generally celebrated among the Hindus). No regular subsidiary industries are conducted by the cultivators but they do employ their spare moments in rope making, basket making and in manufacturing *ghi*.

(*b*) As I have already said, the establishment of suitable subsidiary industries is as necessary in the interests of the agricultural economy of the village as the introduction of agricultural reforms. The adoption of subsidiary industries can only be popularised by regular propaganda, organisation and grant of financial help, and it should be the work of the Industries Department to examine the conditions of each village and to suggest suitable subsidiary industries. Arrangements for the supply of implements and raw materials, and the marketing of finished products, can be undertaken by the Co-operative Department by means of societies and unions but Government subsidy will be necessary. The cultivators will be quite willing to take to subsidiary industries provided they are shown the way to make them profitable. I can think of two industries which would be of larger application and which will suit the general population. These are, (1) the milk industry and (2) spinning and weaving. Also, knitting and lace making would be very suitable for the women. The milk industry, if properly organised, can be made very profitable to cultivators. As regards spinning and weaving, their wide-spread introduction will be easier than that of any other industry. If a cultivator devotes the slack season to weaving the coarse cloth needed for his family it will provide enough economic occupation; the *charka* is as old as India.

(*c*) Poultry rearing would not generally be acceptable to Hindus. In regard to the establishment of the other industries mentioned in this question, the only obstacle I can think of is lack of organisation. Lac cultivation would be very profitable in Chota Nagpur. Basket making is capable of much improvement.

(*d*) Yes, in particular, in the case of oil pressing, sugar making, rice hulling and utilising of rice straw for paper. There is a great demand among the cultivators for small rice hulling machines which can be easily operated in the villages.

(*e*) Introduction of the larger industrial concerns in rural areas might paralyse the agricultural economy of the village and it should, in my opinion, be avoided unless the whole village is to be converted into an industrial town.

(*f*) Yes, this is urgently called for.

(*h*) The formation of unions and establishment of union boards under the Bihar and Orissa Village Administration Act of 1892 is likely to stimulate the people into taking a real interest in the improvement of their sanitary and hygienic conditions. At present the Act is being applied very cautiously but an extension of the Act will conduce more than anything else to create interest among the people in their own local problems.

QUESTION 20.—MARKETING.—(*a*) I consider the existing marketing facilities to be quite unsatisfactory. The bulk of the agricultural produce is at present marketed through a host of middlemen. I do not object so much to the middlemen; they are to some extent a necessary evil; but there are too many of them and the majority of them are not honest in their dealings. Establishment of co-operative sale societies and open markets would minimise the existing evils. India is fast becoming a country of *dalals*. The big merchants work through the *dalals* who have no hesitation in adding to their legitimate income by cheating the cultivators. In the absence of any authoritative information regarding market rates the cultivators are entirely in the hands of these *dalals*.

(*d*) Yes, this seems to me to be absolutely necessary.

QUESTION 22.—CO-OPERATION.—(*a*) Government should shoulder the entire cost of registration and audit and grant adequate subsidies to non-official agencies to undertake (*a*) propaganda, (*b*) training of staffs, and (*c*) education of members in co-operative principles. Registration and audit are statutory duties and I do not see why their entire cost should not be borne by Government. At present, Government pays the entire cost of the superior staff entertained to carry on the work of registration but partially meets the cost of audit: Audit charges in this Province amount at present to one-and-a-half lakhs of rupees, while the Government contribution is only Rs. 61,000, the balance being made up by the co-operative societies themselves. If the societies are freed from the levy of audit fees, they will be in a better position to develop and to heal their institutions.

The Lyall Committee of 1921 recommended the employment of one Assistant Registrar for 1,000 societies, but experience has shown that it is impossible for one Assistant Registrar to properly control the working of so many societies. The standard should be one officer for 500 societies. It is a mistake to leave the fate of a society entirely in the hands of the Central Bank. Central Banks have no doubt been a great success as financing agencies but they have their limitations as agencies for the betterment of the societies. It is, therefore, necessary, at any rate in the existing state of affairs, to augment the Government staff so that the working of the societies may be brought under the closer watch of a separate agency.

The Government staff should, in my opinion, consist of (1) a Registrar, (2) five Deputy Registrars, one for each division, (3) Assistant Registrars on the scale of one for 500 societies, and (4) a Chief Auditor. As regards

subsidies towards propaganda and training, my idea is that Government should meet the entire cost of the maintenance of a school for training the staff and grant subsidies to enable the Bihar and Orissa Co-operative Federation to entertain, in collaboration with the Central Banks, a staff of itinerant lecturers to go round the societies and unions for the training of members.

The Bihar and Orissa Co-operative Federation, which is a federation of the Central Banks and societies in this Province, is the only non-official agency which is interested in the development of the movement. It is divided into two branches—(1) audit and (2) development. It levies fees on all societies under both these heads and receives certain subsidies from Government. It has opened training classes at Sabour where the subordinate staff is trained. It is handicapped for want of adequate funds.

If, as I have suggested above, the entire audit cost is borne by Government, the federation will be in a better position to devote itself to the work of development. It has got five divisional federation boards, one for each division, which are merely advisory bodies. The federation would do well to institute, in conjunction with the Central Bank, a development committee for the propagation of co-operation and all subjects of rural reform for the area of operations of the bank. I consider the formation of development committees of the greatest importance for the proper development of the movement. It should be made incumbent on other non-official agencies such as district boards to render all possible help, including financial, to the development committees.

(*b*) (i) The main needs for the development of credit societies are (1) education in management and in co-operative principles, (2) adequate financing, including the provision of long-term credit for the redemption of old debts and land improvements and (3) reduction in the rate of interest.

For (1), good teachers and closer touch with the higher officers of the department are needed. As regards (2), under existing conditions when old debts are being only partially redeemed by societies, only forty per cent of the loans taken by societies are for payment of old debts, but if we start with complete redemption of old debts, the percentage will very much increase. The Central Banks cannot afford to grant so much long credit under their existing finances, two-thirds of which consist of deposits held for varying periods from one to three years. The only solution which strikes me is that Government should come to their aid by either (1) providing long-term loans to the Provincial Bank or (2) guaranteeing debentures issued by Provincial Banks. Government grants considerable financial assistance to district boards and municipalities and I do not think it is too much to expect Government to render similar financial assistance to the co-operative movement which aims, as much as local bodies, at the amelioration of the condition of the masses. If co-operation can be turned into a method of rural reform, Government should not hesitate to spend on it freely. In regard to (3), reduction in the rate of interest, I have already said that this reform is urgently called for. As a matter of fact, the village moneylenders have reduced their rates of interest to somewhat below the society rate, a fact which is hampering the growth of membership of societies.

(ii) Co-operative stores for the purchase of domestic requirements have had a chequered career in this Province. Their position was examined only in 1925 and it was found that, with the exception of those started for catering for the wants of a definite and assured *clientèle* such as those at Pusa, Kanke and Patna Secretariat, they have generally met with failure and loss. Reference is invited to Government

Resolution No. 533-D., dated the 16th February 1926 (*Vide Appendix*) dealing with the general position of purchase societies and embodying directions for the policy to be followed in the future. There is no necessity for the establishment of rural co-operative stores as it seems difficult to undersell the village *bania*. As regards stores for larger towns, they will be useful but they should not be allowed to run on borrowed capital (including deposits from non-members).

Stores for the purchase of agricultural requirements such as manures, seeds, implements are the stores which are absolutely necessary in the interests of agriculturists. In order to help the cultivator it is not only necessary to supply him with cheaper money but it is equally necessary to supply him with agricultural requisites of good quality. In my opinion, this need can be best met by the Central Bank starting one or more societies as may be required in its area. But buildings will be needed for these stores which the Central Banks cannot afford, all by themselves, to supply. Liberal Government aid is required to create such societies for the Province. With Government aid seven Central Banks are employing special clerks and building godowns for supervising the supply of manures and seeds. It would not be a bad idea to assign the work of running these stores to the development committees, the formation of which has been recommended above.

(iii) SOCIETIES FORMED FOR THE SALE OF PRODUCE OR STOCK.—We have not yet organised pure sale societies for the sale of agricultural produce. Although sale societies are the most important they are very difficult to manage. In conjunction with the primary societies, sale of agricultural produce was undertaken in certain areas but owing to the smallness of operations the venture did not prove much of a success. There are, however, no reasons to doubt the success of large sale unions which would pool the agricultural produce of the members of societies in a defined area. In the existing state of affairs such societies will require considerable spoon feeding from Government. The greatest difficulty in the running of sale societies is prevention of wastage and leakage. Good buildings and good staff are, therefore, required. There is a great demand for the establishment of such societies and it is in contemplation to organise them in suitable areas. The co-operative movement should aim at a complete sale and supply organisation on a national scale and although under existing conditions the aim is difficult of attainment in the near future, the task of the wholesale marketing of produce must be seized at once and worked up to over a period of years. There is considerable loss to the cultivators in the existing state of affairs when the merchants' agents go about scouring the country to exploit the cultivators. The temptation of getting advances even before the crops have been harvested proves too much for the cultivators who generally agree to sell their produce at rates most unfavourable to them. This can only be stopped by the organisation, on a co-operative basis, of sale unions. I am opposed to primary societies being impressed into service for undertaking sale work as not only multiplication of work for a credit society is undesirable but it is beyond the capacity of a primary society to successfully carry on trading on its own. For the present I think the sale societies should confine their activities to the sale of a few particular commodities such as rice, potatoes and turmeric instead of undertaking the sale of agricultural produce in general.

(iv) We have not got societies earmarked for effecting improvements but primary societies are undertaking various kinds of land improvement work by giving out loans at cheaper rates of interest for wells,

bunds and smaller irrigation projects. This is a line in which considerable success can be achieved provided enough funds are available at cheaper rates of interest. It should be the function of the credit society to finance all local schemes of improvement and it should not be necessary in a village where there is a credit society to start another society for effecting land improvements. Of course, if any big irrigation project is to be taken up affecting several villages a special society may be formed.

(v) SOCIETIES FORMED FOR THE AGGREGATION OF FRAGMENTED HOLIDINGS. —*Vide* answer to Question 7.

(vi) No such society exists in the Province. A power pump irrigation society was launched at Siris in Gaya district but for various reasons it could not be made to function and ultimately it was made over by Government to the Agricultural Department. I think it is beyond the capacity of the Co-operative Department to deal successfully with such societies. All such ventures should be initiated, controlled and directed by the technical departments concerned, the Co-operative Department only helping in the formation of societies.

(vii) SOCIETIES FOR JOINT FARMING.—I think the establishment of such societies should be encouraged as much as possible. No doubt it is a very difficult task to bring the cultivators to agree to joint farming but a few successful cases will open the eyes of the cultivators to the advantages of joint farming. We have not yet seriously undertaken it in this Province but I am very much in favour of it and from the talks that I have had with some cultivators I am very hopeful. I think that by joint farming alone the produce will be increased by twenty-five per cent.

(viii) There are no such societies in this Province. In my opinion it should be the duty of the Veterinary Department to start such societies with our help.

(ix) In this line we have broken new ground by starting societies devoted purely to the work of village welfare in Khunti sub-division in the Ranchi district. Their object is to carry out village reforms by joint action. The first society of the kind was started at Peloul village and fourteen more societies have now been started. It is very interesting work and if it proves a success, as it should, it will popularise the idea that the villagers have only to organise themselves for their rural needs.

A scheme for the formation of a milk supply union on the lines of the union in Calcutta is in contemplation. The establishment of societies amongst milkmen, with milk unions, would conduce not only to the improvement of cattle but would also solve the question of the supply of unadulterated milk. I think there is great scope for the establishment of such societies and unions in this Province.

(*c*) Yes. The Bihar and Orissa Minor Irrigation Works Act, 1922, has already countenanced such legislation.

(*d*) Credit societies, on the whole, have been successful in achieving what I may call the lower plane of their function. Judged from the point of view of supplying cheaper money to meet the needs of the cultivators, credit societies are acknowledged to be very useful. There are deficiencies in their working but these were bound to arise in the wake of the expansion of the movement and will be mended and removed. They have eminently succeeded in bringing the *mahajans* to their senses. In no village where a society exists can a *mahajan* now charge an exorbitant rate of interest nor can he afford to be so rapacious and dishonest as he used to be. The *mahajan's* rates of interest

have been brought down in a good many places to almost the level of the society rates. In some places the rates are even lower. Along with the material gain there are the beginnings of a moral gain noticeable where the society has been in existence for some time. It is now the prevailing idea that the society members can, by presenting a united front, help themselves against a common enemy. I have found this a great source of strength among the members and one which they value more than any other advantage arising from the existence of the society. But a good deal remains to be done and no one, unless he is in the thick of the movement, can realise the stupendous character of the task.

QUESTION 23.—GENERAL EDUCATION.—(*a*) If, as already suggested, agricultural schools are established, general education may be left to run its own course. Of course a certain amount of agricultural bias should be imparted in all rural education.

Rai Bahadur Durga Prasad.

APPENDIX.

GOVERNMENT RESOLUTION No. 533-D, MINISTRY OF EDUCATION, (AGRICULTURE), DATED PATNA, THE 16TH FEBRUARY 1926.

Owing to the failure of several co-operative "stores" and the unsatisfactory reports received on the working of others, the Registrar of Co-operative Societies was asked to make a special inquiry into the causes of these failures and submit a report to Government. His report shows that, while a few urban stores working under special conditions, to which reference will be made below, have proved successful, with one or two exceptions, all the others are in difficulties or have actually collapsed. His conclusions are that stores for the supply of necessaries of life in urban areas are not likely to succeed in this Province at present, but that similar societies constituted in isolated places, where the ordinary system of distribution is not available, may do well. He is anxious to encourage organisations for the sale of agricultural produce and eventually to develop the supply of some of the primary necessities to societies in rural areas, and believes that with certain safeguards they will still prove a success, as they have done in other countries. He is also in favour of encouraging the development of societies for the supply of raw materials to groups of artisans working in their own homes.

2. These societies for purchase, production and sale may be grouped under three heads, so far as Bihar and Orissa is concerned. There are urban societies for the supply of goods to consumers, agricultural sale and supply societies and industrial sale and supply societies. The first named may be called true co-operative stores of the type which has proved so highly successful in the United Kingdom and other countries. Experience shows that there is very little room for them in ordinary circumstances in this Province. Any attempt to organise societies of this type is greatly handicapped by lack of business knowledge and experience among the officials who have to supervise them, the paid staff and the members themselves, and by lack of leisure or desire to help among those who might supervise them. The result is that absurd mistakes have been made under amateur management, and much money has been lost by unbusinesslike methods, lack of supervision and even dishonesty. For the actual necessaries of life, it is doubtful whether in the larger towns there is very much scope for these societies at all. At any rate, they cannot succeed unless their organisers will give up more time to supervision and until a better trained staff is available. If further experiments are to be made, they will have to be conducted on a small scale and with limited capital. In the beginning, societies were established with a small paid up capital and were allowed to enjoy large credits from central societies. As the liability of the members of the stores was limited, there was no security for these advances, and the ease with which funds were procurable led the directors of the stores into speculation and even worse. If this type of society is to develop on sound lines, the supply of outside capital must be very strictly limited and the members must work mainly with their own capital, whether in the shape of shares or deposits. The only exceptions to the general record of failure are the stores at the Pusa Research Institute and the Kanke Mental Hospital, and the Secretariat stores in the New Capital. These stores owe their success partly to the fact that in many lines they had not to meet competition from the private distributor owing to their isolated situation and the newness of the settlements, and partly to good management. They, in fact, filled a real want and the members thought it worth while to take the trouble to look after them. In all the circumstances,

Government would be inclined to leave these stores to the gradual process of evolution, were it not that there is a danger that the funds of Central Banks, organised primarily for the service of agricultural societies whose share capital and reserve have been provided by the members of those societies, may be dissipated by imprudent advances to urban stores. For this reason, and because societies of this type are likely to develop better if they find capital not too easy to obtain, Government consider that, except with the special orders of the Registrar, co-operative stores should not be allowed to borrow or seek deposits from non-members. Thus, they will as a rule be limited to their own share capital and deposits from members, as in the case of ministerial officers' societies. If permission is given to borrow from outside, either in the shape of deposits, loans or cash credits, then no society shall be allowed to borrow from this source more than the amount of its paid-up share capital or the reserve or uncalled liability of the members on their shares, if this is greater, while in no case shall the outside borrowings exceed twice the paid-up capital, and such debts shall have priority over deposits received from members.

3. The position of agricultural sale and supply societies, *i.e.*, societies for the sale of agricultural produce of their members or the supply of articles to persons living in rural areas, is different. In other countries, societies for the sale of country produce have proved successful, especially in those cases where grain is exported in large quantities. They have enabled farmers to reserve to themselves some of the profits which the middleman formerly took and at the same time to obtain a better price for their produce by careful grading. Another sphere in which societies of this type have been particularly successful is in the disposal of dairy produce. Again, great advantages have been derived in the purchase of manures and fertilisers which are particularly liable to adulteration. In Bihar and Orissa the attempts to organise societies of this type have all failed. Here again, the failures are due to much the same causes as those of the urban stores, but the mismanagement has been worse and the speculation even more ill-judged. Societies formed mainly with the idea of obtaining better prices for the agricultural produce of members and supplying them with the necessaries of life have been ruined by reckless attempts to deal in articles regarding which the directors and the staff had no knowledge or by the purchase of unsuitable articles for sale to the members.

4. One method followed was to make advances to members of agricultural societies to the extent of eighty per cent of the value of their produce in order to enable them to hold it up to obtain better prices, but even this relatively simple operation has failed owing to lack of organisation and business ability. Other difficulties which have to be faced are the size of the area to be served, the illiteracy of the cultivating classes and their inability to grasp the object of the societies, with the result that they see no reason why they should be loyal to them. The societies for the sale of produce in other countries which have proved so successful consist of groups of educated farmers who consciously established them in order to obtain benefits, which they could easily visualise. A similar society in this country is organised by well-meaning amateurs who are not cultivators and have no business knowledge or ability. It is imposed from above and not built up from beneath and the members have the vaguest idea of what it all means. They are induced to join in the venture by glowing promises and are naturally indignant at being called upon to pay up their share in the event of failure, all the more because they have nothing to do with either the organisation or the management.

Rai Bahadur Durga Prasad.

5. The same remarks apply to attempts to supply the agricultural population with the ordinary necessities of life. In special circumstances, such as the disorganisation of the ordinary channels of trade during the great War, salt, kerosene oil, cloth and other articles have been supplied to cultivators in other Provinces, with a fair amount of success, but here again, amateur management and the size of the area to be served created the same difficulties. It is quite impossible at this stage to organise stores in each village, and a central organisation to serve a large area like a sub-division, which would tax the capacity of the most experienced business man, is obviously certain to break down if managed by untrained officials, lawyers and zamindars. Further, it is very doubtful whether in ordinary circumstances the savings to be effected in either purchase or sale are so great as to make the risk worth while. Members of credit societies are now able to borrow money for all reasonable purposes at relatively low rates of interest, and this should enable them to hold up their produce until the market is favourable, while the possibility of obtaining cash when required helps them to purchase the necessities of life on fairly favourable terms. Subject to what is said in the concluding paragraph, therefore, Government consider that no more societies for the sale of ordinary country produce or the supply of necessities of life in rural areas should be registered at present.

6. There is, however, a sphere in which these societies have an essential part to play, simply because there is no other existing organisation and no such organisation is likely to come into existence, except very slowly, while even then it may be unsatisfactory, as it has been in other countries. The Agricultural Department is now recommending and providing improved seed or seed of new crops, manures, especially artificial fertilisers, improved agricultural implements and similar articles or commodities. Agricultural sale and supply societies are really required in order to organise the supply of those articles, which members of societies otherwise could not get and of which possibly at present they do not realise the need. The co-operative organisation is, in fact, absolutely essential to the Agricultural Department, if it is to disseminate its discoveries and improvements on a large scale. A further step will be to buy up improved crops from the cultivators either for the purpose of seed stores or in order to provide a market for a new crop until a general demand springs up for it, or to gain the advantage which sale in bulk of a better type of produce will bring. Not only should such societies of this type be encouraged, but it is the duty of the Registrar and the Director of Agriculture to take the initiative in organising them and to use them to the greatest possible extent. In this case, provided that no credit is allowed, a large paid-up capital is not necessary, and in fact in other countries societies of this type seem usually to operate with a very small paid-up capital and with borrowed funds. As members of rural societies can always obtain advances from their credit societies for this purpose, there is no need to supply seed and manures on credit and, provided that no credit is given in any circumstances whatever, the working of these societies should be quite simple and within the capacity of amateurs. It is desirable, therefore, that a proper trained staff should be provided as soon as possible and it will be for the Registrar of Co-operative Societies and the Director of Agriculture to arrange for this in consultation.

7. Industrial sale and supply societies fall roughly into two groups, weavers' stores and artisan supply societies. Weavers' stores in Bihar and Orissa have definitely proved a failure, and the Registrar agrees that no further societies of this type should be registered at

present. The failure is due partly to the causes mentioned above and in particular to amateur management, but partly also to the conservatism and disloyalty of the weavers themselves. Some organisation for the supply of fly-shuttles, dobbies, dyes, fine yarns, etc., is required by the Director of Industries in those districts in which he is engaged in demonstration work, but it seems better for the present that the Industries Department should establish stores of its own, with advisory committees of weavers where possible, in the hope that in time the weavers will begin to realise the situation better, when stores may eventually be established on a co-operative basis.

8. Other industrial societes of this type have proved more successful, chiefly because their working is more simple and it is possible to maintain a close control over the members who live in a confined area. Some of the best of these societies are those among the workers in bell-metal. In these cases the society supplies the raw material and stores all finished articles prior to sale, keeping both under lock and key in its own warehouse. Societies of this type are of real benefit to the village artisan, who up till now has been practically a slave to his dealer. The only danger is one of those which has brought about the ruin of weavers' stores and that is over-production. Hitherto, the dealer took care that supply did not out-run demand, and if the market was bad the artisan got no employment and had to live as best he could. The danger now is that so long as he can obtain raw materials he will continue to take them and to turn out finished articles regardless of whether they can be sold or not. Provided that the societies guard against this danger, they seem to be doing real good to the artisan.

9. In laying down these instructions, Government do not wish to preclude further experiments being made in various directions, but if such experiments are made, they should be undertaken very cautiously and only in places where the closest supervision from the department is possible. The Registrar has already been instructed not to organise any society for the utilisation of machinery or for irrigation purposes except with the approval of the Development Board, and Government consider it desirable that any further schemes for the establishment of the types of society now barred should also be discussed by this Board before they are brought into being.

Oral Evidence.

66,034. *The Chairman*: Rai Bahadur Durga Prasad, you are Registrar of Co-operative Societies in the Province of Bihar and Orissa?—Yes.

66,035. Would you give us, briefly, an account of your training in co-operative methods?—I have been Registrar now for the last sixteen months. I also officiated in 1924 for about eight months.

66,036. Before that you were not in the department?—I was not in the department at all.

66,037. Apart from those two periods, have you had any intimate acquaintance with co-operative matters?—Yes, I had some intimate acquaintance with the subject as Sub-Divisional Officer and District Officer.

66,038. Have you had the advantage of seeing co-operation in any other Province?—No.

66,039. Have you had sufficient time, as yet, to form any firm opinion as to the soundness or the reverse of the co-operative movement in Bihar and Orissa?—I think so.

Rai Bahadur Durga Prasad.

66,040. You do think that you have had an opportunity to form a view?—Yes.

66,041. To what conclusion have you come?—My conclusion is that it is financially quite sound.

66,042. Is it sound in other directions?—No, I do not think it is as yet sound in other directions.

66,043. Would you tell the Commission, quite frankly, your views on any important points in that respect?—I mean to say that our co-operative societies are not genuinely co-operative yet.

66,044. In what respects?—I mean, in the higher principles of co-operation.

66,045. Would you agree that the vigour of the primary society is the foundation upon which the whole co-operative structure must be built?—I entirely agree.

66,046. Would you agree that if the primary societies are to be, in fact, co-operative societies and are to have their maximum beneficial effect upon the rural population, it is necessary that the members of primary societies should understand the principles of co-operation?—Yes.

66,047. Is it your view that members of primary societies in Bihar and Orissa, as a whole, have been educated in the principles of co-operation?—No, I do not think that they have been properly educated.

66,048. Are you satisfied with the management of primary societies? Do the societies work well?—No, I am not satisfied with the management of the societies by the managing committees.

66,049. Are the members of primary societies who are members of the managing committees taking any interest in, or any part in, the management of the primary societies?—No.

66,050. Do they attend the annual general meeting?—Yes, they do.

66,051. In the matter of loans by the credit societies, are the qualifications of the applicant for a loan examined by the committee of management of the primary society?—They are examined at the annual general meeting by the committee of management.

66,052. Are the qualifications examined before, or after, the loan has been granted?—Before the loan is granted.

66,053. Does that mean that the intending borrower has always to wait until there has been an annual general meeting before he can get a loan?—What we do is this: At the annual general meeting we assess his credit and in the year we allow him loans accordingly.

66,054. *Mr. Calvert*: Who are 'we'?—I mean the committee of management.

66,055. *The Chairman*: Would you tell us, in a concrete form, how this scheme works. Your individual member of the primary society goes to the committee of management and says that he wants to borrow so much. Let us say that that occurs a week after the annual general meeting. Then what happens?—Then the committee sends the loan application to the Central Bank and the Central Bank grants it straight away.

66,056. And the position is reviewed at the next annual general meeting of the primary society?—Yes.

66,057. Where is made the detailed examination of the applicant's suitability for this particular loan? Is it examined by the primary society or by some officer representing the Central Bank?—It is

examined, as I said, at the annual general meeting. The question as to how much loan he ought to get in the particular year is examined at the annual general meeting and within the limit fixed he gets his loan from the Central Bank.

66,058. What period of time elapses, as a general rule, between the application for a loan and the granting of the loan?—About two weeks.

66,059. The Central Banks appear, from the information at the disposal of the Commission, to have come to occupy a very important place in the structure of co-operation in the Province. Are you satisfied with the division of responsibility in money matters between the Central Bank and the primary society?—Yes, on the whole I think it is quite satisfactory.

66,060. Have any primary societies any reserves?—Yes, they have got plenty of reserves.

66,061. Individual primary societies?—Yes.

66,062. Where are these reserves held?—Fifty per cent of it is deposited in the Central Bank.

66,063. You have 6,608 societies with 177,136 members with a working capital of Rs. 1,62,64,536, is that right?—Yes, those are the figures for the year 1925-26.

66,064. Out of that working capital the share capital of the agricultural societies was Rs. 7,35,692, the reserve funds Rs. 16,99,816 and the deposits of members Rs. 3,36,618?—Yes.

66,065. So that the total capital provided by your members was under twenty-eight lakhs of rupees or only about seventeen per cent of the working capital, is that so?—Yes.

66,066. Non-members' deposits represent about two lakhs of rupees?—Yes.

66,067. So that, in the main, your Central Banks are dependent for funds upon sources outside the co-operative movement?—Yes.

66,068. Your Central Banks, numbering fifty-eight, have a working capital of approximately one-and-three-quarter crores?—Yes.

66,069. Can they attract further funds whenever they can usefully employ those funds?—Yes.

66,070. They have no difficulty in attracting money from the public?—None whatever.

66,071. Has there been any propaganda by the department in order to point out to the investing public the attraction of investment in the Central Banks?—There has been no propaganda for that.

66,072. What section of the public has provided the greater part of these funds in the Central Banks?—Government officers have got the largest amount of deposits.

66,073. Officers both on the active and retired lists?—Yes.

66,074. What rate of interest are they receiving?—We used to pay eight per cent before, and that was the maximum rate; but seven per cent is now the maximum rate.

66,075. You say that there is no difficulty in attracting new money at seven per cent. Have you tried to attract new money at six-and-a-half per cent?—Our deposit rates vary from six to seven per cent.

66,076. I am only concerned to ascertain whether you have tested the possibility of getting your money a little cheaper?—We can get any amount of money at six per cent.

Rai Bahadur Durga Prasad.

66,077. Are you still borrowing at seven?—We are now bringing it down to six per cent.

66,078. Is there any hope of borrowing below six per cent.?—Not at present.

66,079. You agreed, a moment ago, to the statement that seventeen per cent approximately, of the working capital of the movement comes from members. Do you regard the high percentage of non-member capital as a source of possible weakness?—Yes: I do.

66,080. Could you suggest any means of correcting that disparity?—By popularising deposits from members.

66,081. Do cultivating members take any interest in the movement?—Not so far.

66,082. Has there been steady propaganda towards that direction?—We are carrying on some propaganda.

66,083. What agency have you for carrying on the propaganda?—On behalf of the Central Banks we have got the managers and the inspecting clerks.

66,084. Are you, as Registrar, entirely dependent on the Central Banks for propaganda?—Yes, also on the Bihar and Orissa Co-operative Federation.

66,085. Have you no subordinates or agents in the districts who can place you in direct touch with the primary societies?—Yes; we have got nine Assistant Registrars who are in charge of the nine circles into which the Province is divided.

66,086. Do they come into direct touch with the primary societies or do they work through the Central Banks?—They go and inspect the societies.

66,087. Do not the Central Banks loom much too large in the matter of management and surveillance?—Certainly.

66,088. I see that the rate of interest charged by primary societies to the borrowing members varies more or less in accordance with the average rate charged by *sowcars* in the district; is that so?—No; our rate is uniform. The rate charged by the societies to the members is almost uniform; it is Rs. 15-10-0 per hundred rupees.

66,089. In the "Memorandum of Rural Conditions in Bihar and Orissa"* prepared by officers of Government for this Commission, I see at the bottom of page 18, the following statement: "The comparatively low rate of interest charged on such loans has undoubtedly had the effect of reducing the rates of interest charged by ordinary *mahajans* in areas where societies exist, so that it is possible to take the average normal rate of interest in such areas as 24 per cent. The ordinary rate charged by societies is 15½ per cent, but where the local rate of interest is above 25 per cent the societies generally charge 18¾ per cent." Is that or was your previous statement, correct?—We do charge 18¾ per cent in certain societies in the backward areas.

66,090. Is this policy, of varying the rate of interest charged by societies to members borrowing, the result of a desire on the part of the Central Banks to obtain as high a rate of interest as possible for their money, or, on the other hand, is it a deliberate policy designed to lessen the risks of providing cheap credit to those who are unfamiliar with its use?—It is the latter.

66,091. Do you think that the time has come to reconsider that policy; or do you recommend that it should continue?—I think the time has come to reconsider the policy and to reduce the rate of interest.

---

*Not reprinted.

66,092. What steps are taken, and by whom, to ensure that members borrowing for a particular purpose do, in fact, apply the amount of the loan to that purpose?—That is left to the officers of the Central Banks, that is to say, the managers.

66,093. Do the chairmen and committees of primary societies take no part in that work?—They do take some part in the work; they do make enquiries, but we have them tested by the managers of the Central Banks.

66,094. What is the constitution of a normal Central Bank in this Province?—There is a board of directors (generally about twelve to fourteen directors) half of whom are drawn from preference shareholders, and half from the ordinary shareholders, that is to say, the primary societies. The ordinary shareholders must be primary societies.

66,095. The ordinary shareholders must be primary societies? Is that one of your rules?—Yes.

66,096. Are any steps taken to endeavour to secure an element of representation to small cultivators on the boards of directors?—The ordinary shareholders are cultivators.

66,097. That does not necessarily follow; anybody may be a member of a primary society?—So far as the agricultural societies are concerned, the majority of the members are cultivators; there are very few landless members.

66,098. Are you satisfied that the small cultivator has a sufficient voice on the board of directors of the Central Bank?—Yes; quite sufficient.

66,099. The board members sit as representative shareholders; there is no representation of primary societies as such; is that so?—There is representation of primary societies as such; they are the ordinary shareholders; each society is an ordinary shareholder.

66,100. All your ordinary shares in the Central Banks are held by primary societies as such?—Yes.

66,101. Are any ordinary shares held by individuals?—No.

66,102. The 83 per cent of your working capital which has been supplied from outside the movement is all invested in what form?—With the societies.

66,103. By the Central Banks?—Yes.

66,104. But is it in the form of preference shares?—No; it is not in the form of preference shares.

66,105. Who holds the preference shares?—Individual members of the public.

66,106. Must they be co-operators?—There is no hard and fast rule in that respect.

66,107. Could you give us the extent of your ordinary share capital and preference share capital?—I do not think we have got these figures in our annual report.

66,108. Could you let us have these figures* later, if you have not got them now?—Yes.

* Central Banks.	Preference shares paid-up.	Ordinary shares paid-up.	Total.
	Rs.	Rs.	Rs.
Provincial Bank . .	20,000 (Guarantee Shares).	3,20,000	3,40,000
Central Banks and Unions in Bihar.	1,83,523	9,08,874	10,92,397
Central Banks and Unions in Orissa.	83,020	3,03,431	3,86,451

66,109. *Mr. Calvert*: What is the amount of each share?—The preference share is twenty-five rupees and the ordinary share ten rupees.

66,110. The society takes one share, or more?—The number of shares the society takes depends on the amount of loan the society takes.

66,111. *The Chairman*: Could you give us any idea of the extent of your preference share holding?—No.

66,112. Could you give us an indication of the number of persons holding preference shares?—Yes; there are 2,574 holders of preference shares.

66,113. Who sits at the head of the Board of Directors?—A chairman is elected.

66,114. Is he called the Honorary Manager?—He is called the Chairman of the Board of Directors.

66,115. Who is directly under him in the chain of responsibility?—The honorary secretary.

66,116. Who is at the head of the paid permanent staff in the Central Bank?—The honorary secretary of the Central Bank.

66,117. Who is the highest official in the bank, who receives a salary?—The manager.

66,118. Is he a whole time officer?—Yes.

66,119. What do you say about the calibre, and general fitness for their posts, of managers of Central Banks?—Some of them are very good, but in the case of quite a number their calibre is very deficient.

66,120. They are unfit for the posts which they hold?—Yes.

66,121. How about their subordinate staffs?—The subordinate staff consists only of inspecting clerks.

66,122. What do you think about them?—They are generally suitable for the work that they have to do.

66,123. I do not quite understand the following quotation from page 8 of your annual report for 1925: "The bank office is often left to be run by low paid bank clerks, the honorary secretary himself not being, in most cases, able to devote the necessary amount of time to the supervision of the office"?—That happens in banks where honorary secretaries neglect their duties.

66,124. Where is the manager?—He is mostly out on tour. He has to be out inspecting the societies.

66,125. He does tour?—Yes.

66,126. Is he often away from the bank for more than a day?—Yes.

66,127. Is he away for a week?—Not for a week at a stretch, but for two to three days at a stretch.

66,128. While he is away, the bank is left in complete charge of what you call a low paid official?—Yes.

66,129. Who brings pressure to bear on members of primary societies when they are in arrears?—The inspecting clerks.

66,130. There again you are dependent entirely on your Central Banks?—Yes.

66,131. Your primary societies, as it is, take no part in persuading their members to pay up?—They do take some part.

66,132. The responsibility and the real work fall on the Central Bank?—Yes.

66,133. And when an unpopular action has to be taken, is it customary to depend entirely on the Central Bank?—Yes.

66,134. As regards the staffs of the Central Banks, human nature being what it is, there are always regrettable instances in all concerns of this nature no doubt. But is it your opinion that cases of embezzlement are more frequent than they should be? Does that give cause for anxiety in your office?—It does not cause any great anxiety. Of course, there have been some bad cases of embezzlement in two or three Central Banks.

66,135. But you say on page 11 of your report "A regrettable feature of the year was the cases of embezzlement in the banks by the paid employees"?—My own idea is that there should be no embezzlement in this movement, and judged from that point of view, I think it is regrettable.

66,136. Are there signs that embezzlement is on the increase?—It is on the decrease now.

66,137. To that extent, the position is satisfactory?—Yes.

66,138. To return to the paid staff, are they efficient in the duty of stimulating punctual repayment and payment of interest?—Yes, they are efficient.

66,139. In the same report you say "I cannot help observing that except in a few cases the poor collection is due to the negligence and inefficiency of the paid staff". That, I take it, is the collection of arrears?—Yes, it is the collection of arrears.

66,140. Will you define your own responsibility *vis-a-vis* the Central Banks?—My own responsibility, as I take it, is to guide them and to advise them.

66,141. What do you mean by "to guide them"?—To see that they are carrying on their work on proper lines.

66,142. You told us that there is more than one Central Bank the manager of which, in your judgment, is not a fit person to hold his position?—Yes.

66,143. What action on your part is appropriate in a matter of this sort?—I can cancel his license.

66,144. Have you cancelled any licenses?—Yes.

66,145. Do you propose to pursue that policy and to continue it until the managers are satisfactory?—Yes, and to weed out all the bad managers.

66,146. I think you have been sixteen months in the office?—Yes.

66,147. Will you tell us how many licenses of managers you have cancelled during the sixteen months?—I think about two or three so far; we have cancelled the licenses of a good many inspecting clerks.

66,148. But of only two or three managers?—Yes.

66,149. Do you gather, from your observation of the movement, that the main interest and concern of boards of directors is to do the best they can for their shareholders, or to do the best they can for the primary societies and for the advancement of co-operative principles in the Province?—At present, I find that they are concerned with doing the best they can for the shareholders.

Rai Bahadur Durga Prasad.

66,150. And that situation exists in the face of an organisation which leaves the day-to-day management of the primary society itself very much in the hands of the Central Banks?—It is entirely in the hands of the Central Banks, except for the supervision exercised by the Assistant Registrars.

66,151. Is that a satisfactory state of affairs?—No.

66,152. Do you think that the movement as a whole is declining in efficiency at present, or is it stationary, or is it improving?—It is stationary.

66,153. You do not think that there is any evidence of decline at this moment?—No.

66,154. Is that entirely in harmony with some parts of your report?—My remarks in the report refer to two or three banks which are in a very bad condition at present, but we hope to reform them.

66,155. You say in your report "The societies are taking a downward course". Is that to be taken as applying generally to the movement in the Province or to particular societies?—It applies to particular societies. I cannot say that it is general.

66,156. Do you think that the movement is not likely to be restored to health and vigour by any other means than that of placing upon the primary societies, and upon the members of primary societies, the responsibilities which are really theirs? Is that the line of policy which you are proposing to adopt?—Yes.

66,157. Would you tell us a little about your Co-operative Federation? That is a federation of your Central Banks and societies?—Yes.

66,158. That is the central body of the movement?—Yes.

66,159. Are its meetings satisfactorily conducted?—Yes, the meetings are satisfactorily conducted. We have a council of the Federation.

66,160. And an annual general meeting?—Yes.

66,161. And then, below that you have meetings of representatives from districts?—Yes, representatives from districts, in divisional federation boards.

66,162. On the whole, are you satisfied with the meetings and the way in which the bodies conduct themselves?—Yes.

66,163. Is the business carried out in the vernacular in all cases?—No, the business is carried out in English.

66,164. In English, at the meetings of the Co-operative Federation?—In the Co-operative Federation, both in English and Hindi.

66,165. And in the next stage below that?—In the divisional boards also it is the same thing; the business is carried out in English and in the vernacular.

66,166. And in the district?—We have no district organisation.

66,167. How about your guaranteeing unions? Are you satisfied with them?—Generally speaking, they have proved a failure.

66,168. Since you have been in your present post, have you called upon the guaranteeing unions to fulfil their functions?—We are trying now to train secretaries of guaranteeing unions.

66,169. How do you mean? Do not these guaranteeing unions already exist?—They exist, but their secretaries are no good and we are training them.

66,170. Are the societies effective?—Generally speaking, they are not as effective as we expected they would be.

66,171. How many primary societies have been wound up?—Very few.

66,172. What is your policy in that matter?—I do not believe in liquidation. I believe in reconstitution.

66,173. Unlimited liability is the rule?—Yes.

66,174. Have you called upon members, in cases of necessity, to meet their obligations under their liability?—Yes, in some cases it has been necessary.

66,175. Have you, in the sixteen months of your responsibility, called upon any guaranteeing union?—No.

66,176. Who acts as liquidator?—Either a good non-official or the manager of the Central Bank.

66,177. Who appoints?—The Registrar.

66,178. In every case?—Yes.

66,179. Who carries out your audit?—We have Assistant Auditors.

66,180. On your staff?—Not on the staff of the Registrar. They are on the staff of the Bihar and Orissa Co-operative Federation. That was primarily an audit federation. Government gives a subsidy. We have a staff of Assistant Auditors to audit the Central Banks and local Auditors to audit the societies.

66,181. *Professor Gangulee*: You have a Chief Auditor?—Yes; he is entirely a paid Government servant.

66,182. *The Chairman*: Where are the local auditors?—They are under the co-operative federation.

66,183. Are they whole time men?—Yes.

66,184. Do you carry out any test audits?—They are done by the Assistant Auditor and the Assistant Registrar.

66,185. The Assistant Auditors audit the Central Banks themselves?—Yes.

66,186. Do you ever have an extraordinary audit of the Central Bank?—No.

66,187. Is it your view that the grain *gola* societies may be useful in the future?—Yes certainly.

66,188. On page 161 of your evidence I see you are inclined to the view that: "the goal of better financing of agricultural operations cannot be reached unless the following are provided, (1) rapid extension of the movement by employment of adequate staff, so that each village may have one society in a measurable distance of time, (2) reduction in the rate of interest to borrowers from co-operative societies so that the maximum interest does not exceed eight to nine per cent." Would you be inclined to put, even before (1), the restoration or rather the establishment of the existing primary societies on a sounder footing and the education of their members in the principles of co-operation?—Yes, most certainly.

66,189. *Sir Thomas Middleton*: In the beginning of your memorandum you suggest a scheme for providing farms for middle class youths. Your idea is that they themselves should provide a certain amount of capital and that they should be able to borrow a portion of the capital from a co-operative society? What proportion of the capital would you allow them to borrow?—That would depend on the means of the farmer.

Rai Bahadur Durga Prasad.

66,190. Do you mean to say that a farmer with no capital should be able to borrow all he needs?—He may, provided he gives good guarantees.

66,191. You have suggested a capital of Rs. 250 per acre for a twenty acre farm; what items of expenditure would this capital cover?—The reclaiming of the land, providing irrigation facilities and all other necessary items.

66,192. Livestock, seed?—Yes.

66,193. Supposing a young man had borrowed the whole of his capital, you suggest that after three or four years he might be able to repay at the rate of Rs. 1,000 per annum?—Yes.

66,194. That would leave him a free income of Rs. 1,000 for all other purposes?—Yes, provided he reaches the limit of Rs. 2,000 after five years.

66,195. This estimate means an average income of Rs. 100 per acre on the twenty acres?—Yes.

66,196. Is not that a very optimistic estimate to make for twenty acres?—I do not think so. I have mixed farming in mind, that is to say, cultivating not only food crops but also commercial crops and growing fruits and vegetables. By doing that they will be able easily to get Rs. 100 per acre.

66,197. He would be a young man without much experience?—I would provide him with some education in an agricultural school.

66,198. Assuming that he was a rice grower, rice might yield him about ninety-five rupees per acre but if he were taking up mixed farming the average value of the mixed crop would be somewhere in the region of fifty or seventy rupees per acre, not one hundred rupees. The balance, you think, could be made out of stock?—Sugarcane would be a valuable crop.

66,199. His expenditure in that case would be heavy?—It would be.

66,200. How much hired labour would he want?—About three labourers.

66,201. Assuming that he did not take up sugarcane, he would still require a considerable amount of hired labour for mixed farming?—Yes.

66,202. You make the statement that after he had paid off his loan to the co-operative society he would have a permanent income of at least Rs. 2,000?—Yes.

66,203. But this permanent income must cover all his outgoings? It would not be a net income?—It would not entirely be a net income.

66,204. He has got to provide for hired labour, replacement of bullocks, purchase of seed, etcetera?—Yes.

66,205. *Mr. Calvert*: You take the view that the ordinary primary society could do all the long term credit required?—Yes.

66,206. From what source?—From the Provincial Bank through the Central Banks.

66,207. Has a Provincial Bank long term loans?—No.

66,208. You mention somewhere that you would like to begin with clearing off the debts?—Yes.

66,209. Could a cultivator clear off his debts in, say, ten or fifteen years?—Yes, in ten years.

66,210. Do you think that the Provincial Bank will be justified in giving loan for ten years?—Provided it can raise long term loans.

66,211. Has it raised long term loans?—No, but most of our deposits are almost permanent.

66,212. Would you propose to raise special deposits for a period equal to the period of the loan?—Provided we can get them.

66,213. Do you think you can get deposits for ten or fifteen years without resorting to debentures?—I do not think so.

66,214. You suggest that weaving would improve the economic position of the cultivator?—Yes, to some extent.

66,215. Do you know if the professional weavers can find a market for all the cloth they are able to produce?—Not at the present moment.

66,216. Are they a comparatively small proportion of the total population?—Yes, they are a small number.

66,217. If the small number of professional weavers cannot find a market for all the cloth they produce, what would be the position if the whole population took to weaving cloth?—I intend that the cultivators should weave their own coarse cloth.

66,218. Who would use the cloth?—The family members. If they can make their own coarse cloth in their spare moments, why should they not?

66,219. You have stated that what brought about the ruin of the weavers was over-production?—Yes, that is in my report.

66,220. If the weavers who form a small proportion cannot find a market for their cloth, what would happen to the over-production that would result if the whole population took to weaving?—It is not a case of over-production. It is just producing what the family requires in the way of coarse cloth. They can do this in their spare moments.

66,221. What would happen to the weavers?—That is a different problem.

66,222. If six to ten per cent of the people can produce cloth for a hundred per cent of the population, what would be the result if a hundred per cent of the population began to weave?—You have not taken into consideration my reservation to the effect that the cultivators should weave cloth only to meet their requirements of coarse cloth and that is all.

66,223. You think it will improve their economic position?—In a way it would.

66,224. What qualifications are required for a Deputy Registrar?—No particular qualifications have been laid down, but generally a senior officer in the Provincial Civil Service is selected. This post has only recently been created.

66,225. Is it necessary that he should have any previous training in banking?—I think he ought to.

66,226. But that is not prescribed?—It is nowhere prescribed, but in the present case we have appointed one of the Assistant Registrars as the Deputy Registrar.

66,227. What are the qualifications of your Assistant Registrars?—They have no particular qualifications. We recruit them from the Provincial Civil Service, that is from Deputy Collectors.

66,228. They are given no special training either in economics or banking?—No.

Rai Bahadur Durga Prasad.

66,229. You asked for a substantial increase of the superior staff?—Yes.

66,230. You suggest an Inspector for every 500 societies?—Yes.

66,231. What qualifications would you require of these inspectors?—In order to economise I would be content with Sub-Deputy Collectors.

66,232. Would they have any special training in economics or banking?—They ought to get a special training, but it does not matter if they do not have that training.

66,233. What duties would you give to these Inspectors?—Inspection of societies.

66,234. Having got 500 societies, in what period of time would you expect the Inspector to get round his 500 societies?—I think he could manage 500 in a year.

66,235. That would be rather a hurried inspection, would it not?—No; if the societies are within a compact area he can manage at the rate of two societies a day.

66,236. Requiring him to tour 200 days in the year is a pretty heavy demand, is it not?—The Registrar himself has to put in more than 200 days in the year.

66,237. You regard the official Inspector as essential?—Yes.

66,238. Do I take it, then, that the number of honorary organisers whom you wish to enlist are not forthcoming?—No, they are not forthcoming.

66,239. Are your honorary organisers trained in the work?—No.

66,240. Are they mostly busy professional gentlemen giving their spare time?—Yes; there are also retired officers.

66,241. But practically you find yourself unable to rely on the honorary organiser?—Yes.

66,242. You say that it has been laid down that no new societies should be registered unless the Assistant Registrar is satisfied that the societies have been carefully organised and bid fair to turn into genuine co-operative institutions. Is that a new idea?—I think so.

66,243. Those two essentials have not been observed previously?—That is so.

66,244. You want to have a manager for every 100 to 120 credit societies? What exactly would be his duties?—To inspect the societies and to train members in co-operative principles.

66,245. Would he train all the members or merely the panchayat members?—He would first confine himself to the panchayat members.

66,246. And who would train the managers?—We are now training them at a class which we hold at Sabour.

66,247. How many months' class is it?—At present it is for three months, but we want to extend the period to six months.

66,248. Does that reach a very high standard?—Not yet; it has been only two years in existence.

66,249. *Professor Gangulee*: Who trains them?—The Assistant Registrar, the Development Officer of the Bihar and Orissa Co-operative Federation and the Chief Auditor. The Registrar also goes and delivers lectures.

66,250. *Mr. Calvert*: Where exactly does your technical professional co-operator come in to teach? The Assistant Registrar trains the manager, but the Assistant Registrar himself has no qualifications.

Where exactly does your expert in rural economics and co-operation come in?—So far as accountancy and thanking are concerned we have got a Chief Auditor, but that is all.

66,251. And for the general co-operative principles and their application?—We have to depend only on the Assistant Registrars.

66,252. What do you regard in this Province as the function of the Provincial Bank?—It is a balancing centre. At present it has got more money than it can invest in the movement; it is faced with a huge surplus.

66,253. What is its object?—That of a balancing centre.

66,254. Not necessarily a financing centre?—No.

66,255. You raise objection to Central Banks raising their own deposits and not borrowing from the Provincial Bank?—Yes, on account of the existence of the surplus in the Provincial Bank.

66,256. Is it any part of their duty to relieve the Provincial Bank of its surplus?—I think so, because it is their bank.

66,257. I should like to ask you whom do you regard as master in this movement and whom the servant?—I do not understand your question.

66,258. In the co-operative movement, who is the master and who is the servant?—The societies are the master.

66,259. Who dictates the policy?—The policy at present is dictated by the Registrar.

66,260. Not by the primary societies' members?—No.

66,261. I do not quite understand how you can reconcile the primary societies being master if the Provincial Bank can dictate to the Central Banks as to where they should raise their money from. Which is built to help which?—Certainly the Central Bank exists to help the societies and the Provincial Bank exists to help the Central Bank.

66,262. So that, really, the Central Bank need not be hauled over the coals for practising self-help in the way of taking deposits?—They have been taking deposits unnecessarily, and also from outside their areas.

66,263. You also find fault with the Central Bank for accepting too many deposits?—Yes.

66,264. And yet you say that this increase of working capital is reasonable?—Not all the Central Banks have been taking unnecessary deposits; only some of them have been doing so.

66,265. Is that practice of taking unnecessary deposits due to a desire to finance primary societies, or is it due to the fact that the deposit rates of interest are too attractive?—I think the deposit rates were too attractive.

66,266. Your maximum dividend in Central Banks is twelve-and-a-half per cent?—Yes.

66,267. Do most Central Banks pay that?—No.

66,268. Under Section 30 of the Act, the lending could be controlled under rules and bye-laws Have not you got rules and bye-laws which would serve to prevent Central Banks from accepting too much in the way of deposits?—No; but we propose to make rules now.

66,269. You propose to reduce the surplus in Central Banks by increasing the membership of primary societies?—Yes.

66,270. For what purpose does your co-operative movement exist? Is it merely to help Central Banks to get rid of their surplus deposits? —Now that we have got the surplus, what are we to do?

66,271. Could they not just pay them back again?—Yes, I have been advising them strongly to pay back.

66,272. Do you favour the policy of Central Banks reducing the rate of interest?—Yes, I favour that policy. The rate of interest everywhere is six to six-and-a-half per cent, whereas it was eight to eight-and-a-half per cent before, while with just a few banks it is six to seven.

66,273. You want the Central Banks to engage in a vigorous campaign in increasing membership?—Yes, we have got a big surplus which is due to the policy adopted in the past.

66,274. You raise a question about its being manifestly unfair that the Central Bank should hold what you call foreign deposits and turn away local deposits. Do you think that the Central Banks have any duty to non-members?—No, I do not.

66,275. Then why do you castigate them?—Foreign deposits mean deposits from outside the area of their operations. If they can get deposits within the area of their operations then why keep these foreign deposits?

66,276. Is that not a matter for the Central Banks to decide?—Certainly, it is a matter for them to decide; but I am only advising them.

66,277. Why should the Central Bank distinguish between non-members? Why should a Central Bank take deposits from outside the Province?—They get deposits from Calcutta, and there is no reason why they should take such deposits.

66,278. But you can check that under Section 30 of the Act by rule. Have you framed any rule?—I have said that we have not framed any rule so far; we are going to do so now.

66,279. You have also advised Central Banks to fix maximum loans to individual members of a society?—Yes.

66,280. Would you mind telling the Commission again who is master and who is servant?—As I have said the master is the primary society.

66,281. You propose that the Central Banks should interfere in the working of self-governing bodies and dictate as to the amount of loan that they should make to individual members, not in the interests of members but in the interest of the Central Banks themselves. You say* "It would take several years to get over the effects of over-financing done in the past but in order to stop any further over-financing the Central Banks have been advised to fix a maximum for loans to individual members of societies and to insist on loans above the maximum being approved by them before they are given"?—That is to stop the issue of very heavy loans; in several cases we detected individual loans to the extent of six, seven or even ten thousand rupees.

66,282. Why should the Central Banks interfere with the working of a primary society? Is the Central Bank in a position at all to interfere?—No, it is not, but it can interfere in this way: it can refuse to grant loans.

66,283. Is that not the simple method of getting out of the difficulty, provided of course they are able to employ their surplus?—There is no harm in the Central Banks advising the primary societies not to issue very heavy individual loans.

66,284. It is not a question of advising but of insisting; they will have to insist. It is all a question of who is the master and who is the

*Report on the Working of Co-operative Societies in Bihar and Orissa, 1926.

servant inside the movement?—I consider the societies to be the masters, and I want them really to be masters; but they cannot become masters unless they are properly trained.

66,285. In your Central Banks, what is the rule of voting?—Each shareholder has one vote.

66,286. Preference and ordinary shareholders?—Yes.

66,287. In all the Central Banks the voting power rests with the society members?—Yes, and they are reducing the rate of interest on their borrowings.

66,288. Do your best class primary societies dispense with every form of help from an outsider, official or non-official?—Yes.

66,289. They get along without help from outside?—Yes.

66,290. You have, in Bihar and Orissa, amended the Public Demands Recovery Act?—Yes.

66,291. Does that result in the more rapid liquidation of societies?—Yes; it helps in the realisation of the dues.

66,292. It is effective?—It is very effective.

66,293. I gather that you have found it desirable to invite Collectors to come back, in some cases, as chairmen of Central Banks?—Yes, in some cases I have found it desirable to do so.

66,294. Speaking still of Central Banks, you say in one place in your report "It is necessary in this area to organise more societies in order to put the bank on a proper financial basis"?—Yes.

66,295. Is it a fair question to ask you, do you promote primary societies for the good of their members, or to get Central Banks out of difficulties?—For the good of the members.

66,296. Is it any function of the primary society to come into existence merely to save a Central Bank from the difficulties it has got into through its own mistakes?—No; but if it can be saved by organising good societies, I do not see any objection to it.

66,297. In the whole movement, whom do you regard as the master and whom as the servant?—I have explained it; I regard the society as master.

66,298. You say that district boards are not helping the educational movement to the extent to which you would like them to do?—Yes.

66,299. Are the members of district boards drawn from different classes than the members of societies?—Yes.

66,300. There is some lack of sympathy between the two?—There is lack of sympathy between the two, at any rate in the present constitution of the district boards.

66,301. You say again: "the control of the Federation over Central Banks should be more effective and real"?—Yes.

66,302. I am sorry to have to ask you the same question again. Who is the servant and who is the master?—This is a federation of all the societies.

66,303. Is the Federation governing the Central Banks or are the Central Banks governing the Federation?—The federation is a body consisting of all the co-operative institutions in the Province, and there is no reason why it should not guide and control the societies. That is my opinion at any rate.

66,304. On a small point in connection with your answer to the Chairman about the interest levied by primary societies: Have you examined the figures to see whether there is any margin of profit in

primary societies to permit of a reduction of interest?—Yes, there is a margin. The margin would not be affected if there is a proportionate reduction.

66,305. You mean that you would only reduce the interest charged by primary societies in the event of the Central Bank lowering its rate?—Yes.

66,306. Do you accept the law as laid down in paragraph 4 of the Co-operative Societies Act that you "may register societies with the object of facilitating the operations of primary societies"?—Yes.

66,307. You accept the law that the sole, possible function open to a secondary society is to facilitate the operations of primary societies?—Yes.

66,308. There can be no other object in law?—No.

66,309. In your report you give a very interesting account of a series of activities of Central Banks in the way of education, public health, and so on. Do you think those are the proper functions of Central Banks?—Yes, I think so.

66,310. You think the Central Banks can in law have those objects?—There is nothing in law to bar them. The law does not bar them from having these activities.

66,311. Take the wording of the Act itself. The only object of a secondary society must be to facilitate the operations of primary societies?—Yes. But this is facilitating the operations of the primary societies, helping them in their social, educational or other affairs.

66,312. You make a remark that it is for the intelligentsia to assist their less educated and ignorant brethren?—Yes.

66,313. And you rather appeal to them to come and promote their moral advancement?—Yes.

66,314. I presume you have mixed a great deal with villagers?—Yes.

66,315. Can you imagine yourself in a village of cultivators suddenly calling out "Here come the intelligentsia to promote our moral advancement"? Can you imagine that as a popular move on the part of the intelligentsia?—Then who is to do this work?

66,316. Is moral advancement any object of a co-operative society?—Why not?

66,317. Is it, I ask you, in law?—I think so.

66,318. You think it is its object?—Yes.

66,319. I notice, in the statements, that your primary societies seem to be repaying more to their Central Banks than they are receiving in repayments from members. Can you account for that?—It is due to the accumulation of reserve funds.

66,320. In a single year?—No; I mean to say the general accumulation of reserves.

66,321. In the last statement supplied to us, I see they are repaying more to the Central Banks than they are receiving from their own members. Where does the difference come from?—That is what it is due to, to the investment of reserve funds.

66,322. Your primary societies invest their reserves with the Central Banks?—Yes, fifty per cent.

66,323. What is the idea underlying that?—The idea underlying that is that they should be separately invested to meet any emergency.

66,324. That is to say, a society having saved a hundred rupees, puts fifty into the Central Bank, and when necessary borrows a hundred from the Central Bank?—Yes.

66,325. Do you think that is sound policy?—That is a moot point. Some people think it is sound policy. This policy was laid down before, and I have not disturbed it so far. I have not got any definite views so far on this point.

66,326. In this Province, if you could get a larger number of educated gentlemen with public spirit and leisure to devote to the movement, do you think you could make a great improvement?—Yes.

66,327. You have found a considerable number, but the trouble is that you cannot find a sufficient number having both leisure and public spirit?—Yes.

66,328. *Dr. Hyder*: Coming back to the question of master and servant, I ask you whether your primary societies, which in your opinion should be masters, are as a matter of fact in a position to be masters by reason of their cohesion, fellow-feeling, organisation, business knowledge and moral outlook?—Some of the societies are in such a position, but speaking generally, I think they are not.

66,329. That accounts for the fact that sometimes the servant becomes the master?—Yes. The servant has to advise the master sometimes.

66,330. Who is the most important man in your primary society? Is it the secretary?—The secretary and the chairman are both important.

66,331. And, sometimes, instead of working in a true co-operative spirit they act in their own selfish interests?—They do.

66,332. There have been such cases?—Yes.

66,333. And that accounts for the weakness of the primary societies? —Yes, in cases where such symptoms have developed.

66,334. As regards the Central Banks, which rise from the position of being servants to become masters, what manner of men are there on the directorates of the Central Banks? What is their occupation? —They are mostly lawyers and zamindars.

66,335. What is a lawyer out for? I suggest to you three possibilities. Either he wants to get more case work, or he wants to catch votes in a particular constituency, say for the district board, or he wants to catch votes for the Council. Is that so?—No. He cannot catch any votes by becoming a director. I do not think there is much in that.

66,336. Perhaps there is not much foundation for this allegation that a large amount of credit is granted to the primary societies on account of the fact that some of the directors who are interested in the primary society turn a blind eye to the intrinsic requirements of such a society?—There is not much foundation for that, so far as this Province is concerned.

66,337. Has it come to your knowledge from reports received from your subordinates that sometimes these secretaries refuse to show to your subordinates their account books?—Yes; it has come to my knowledge.

66,338. What remedies would you like to have under law to proceed against such behaviour, either on the part of powerful secretaries or on the part of directors who turn a blind eye to irregular loan transactions?—I think there should be some provision making it penal.

66,339. You do not require any more powers so far as this matter goes?—No.

66,340. Would you be in favour of enlisting the active help of the intelligentsia?—Yes.

Rai Bahadur Durga Prasad.

66,341. Why are you not in favour of a policy of wiping out societies classified as (*d*) and (*e*)? Do you not think there would be a danger of the gangrene spreading to the whole movement?—I think it would be better to reconstitute the societies because liquidation proceedings have a bad effect on the popular mind. For one thing, liquidation proceedings drag on for a long time.

66,342. *Mr. Calvert*: Even with your special powers?—Yes.

66,343. *Dr. Hyder*: Why are you not in favour of industrial concerns moving out into rural areas? What is at the back of your mind?—I think it would disturb the economy of the village as a whole. If the whole village can be transformed into an industrial centre, then I have no objection.

66,344. Have you toured in the districts of Palamau and Hazaribagh where there are strange customs and practices?—I have been to certain villages in these districts.

66,345. Do you not think it would be a good thing if four masters went after one servant instead of four servants going after one master? In fact the system of agricultural employment in these districts is a system of slavery. Do you not think that it would improve the lot of these people if they took to other avenues of employment?—Yes, I think it would improve their position to some extent.

66,346. Have you formed any estimate of the total amount of money that you would require in order to liquidate the existing debt of the societies?—I think one crore would suffice.

66,347. Could you get that one crore from deposits?—Not all long-term deposits.

66,348. As regards the economics of weaving, is it a fact that the Bihar peasant goes about naked or is he clad?—He is partially clad.

66,349. In what kind of cloth?—It is mostly foreign.

66,350. That seems to show that even they have some surplus with which to buy foreign cloth? Is that so?—Surplus or no surplus, they have to clothe themselves to some extent.

66,351. In case they have no surplus, they have to run into debt on that account?—Yes.

66,352. Your idea is that if the peasant had a certain amount of leisure he could use that to weave some cloth for himself?—Yes.

66,353. The difficulty arises here: Suppose he has a certain amount of money, say, three rupees in the whole year. At present he spends it in the purchase of cloth. You want him to weave the cloth for himself?—Yes.

66,354. Do you not think he is in a better position to know what to do?—Of course it is for him to decide.

66,355. How do you think you can make this movement popular?—I think it can be made a success if a proper propaganda is carried out.

66,356. With regard to what you say on page 163 regarding the obstacles to consolidation of holdings how do you propose to get over, by legislation, the difficulty of the existence of numerous landlords?—By legislation providing that their wishes may be ignored.

66,357. They have got some right in the land and that right is a valuable right?—If their rights are not interfered with and if even then they oppose, they may be ignored.

66,358. Would you give them any compensation?—If they get their proper rent, why should they get compensation?

66,359. How will you diminish this huge number?—What I mean is, if there were only a few landlords in a village, we could bring them round. At present we cannot do so.

66,360. Is *ghi*-making a spare time industry?—Not exactly a spare time industry.

66,361. Is not the business carried on from day to day by the women of the house?—Not only by the women but also by the men.

66,362. Is the churning done by the male members?—No, but they do the other operations in connection with the making of *ghi*.

66,363. Boiling?—Yes. That is done by the males too. Whoever is free does it.

66,364. *The Raja of Parlakimedi*: What are the rates of interest charged locally by professional moneylenders, and at what rate do they collect in kind?—It is twenty-four per cent now. It used to be more before. For grain loans it is fifty per cent.

66,365. After what period do they insist on the recovery of the rent?—It is difficult to say. It is generally one year. In the case of grain loans, it is repayable at harvest time.

66,366. What penal clause is enforced?—There is no penal clause to my knowledge except the payment of interest. There are certain moneylenders who for every loan of Rs. 16-12-0 charge Rs. 25 at the end of a year. It means two rupees per month for the first eleven months and three rupees for the last month. In a case of grain loans, it is generally fifty per cent.

66,367. Suppose a person is unable to pay owing to the failure of his crop, is any leniency shown?—In that case no compound interest is charged.

66,368. Is that custom observed by the local people?—I think so.

66,369. Do you undertake to lend to agriculturists in kind?—In certain areas we are doing it. For example, in Angul, Sambalpur and other places we are doing it. We have got several grain *golas* also in the Santal Parganas.

66,370. What is your rate?—We charge twenty-five per cent.

66,371. What other help do you render to the agriculturists in addition to making grain available?—Our men are available to them for the introduction of improved methods; we help them in all possible ways; our inspecting clerks and managers do it.

66,372. Do they know how to do it?—We send them out to some farms; they also come into contact with agricultural officers; they come to know things and they preach what they know among the society members.

66,373. They help the ryots by supplying manures?—Yes. We get seed and manure from the Agricultural Department and supply them to members of our societies.

66,374. Have you separate societies which take up this business?—We have not got separate societies but some of the Central Banks have seed and manure godowns and they also entertain a staff to distribute the seed and the manure.

66,375. What interest does your society take in cattle breeding?—No interest at all, I should say.

66,376. To go back to page 160: you suggest that agricultural schools should be run by men from your societies and from the Agricultural Department. Are there any such schools in the Province?—There is not a single agricultural school in the Province.

Rai Bahadur Durga Prasad.

66,377. What technical subjects would you have in that school?—Practical agriculture.

66,378. What about agricultural bye-industries?—I do not quite follow you.

66,379. In those schools, would you also include the teaching of those bye-industries which are obtained from agricultural produce?—Yes, that may also be done.

66,380. On page 164 you comment on the introduction of the Bihar and Orissa Village Administration Act of 1892. It is very surprising that no effect has been produced in the villages?—It cannot be said that no effect has been produced. It is being introduced cautiously, I am told. Unions are being established gradually.

66,381. But 1892 is quite a long time off now, is it not?—I do not think it is 1892; that is a mistake. It must be 1922.

66,382. *Sir James MacKenna*: On page 162 of your note, you compare the relentless habits of the Punjabi moneylenders with the honesty and moderate usuriousness of the local moneylenders, and then on the same page you continue to strengthen the position of the local moneylender by saying that in his case debt is looked upon as something traditional and need not be repaid, while the Punjabi moneylender apparently insists on, or demands, repayment. As a co-operator do you not think it is right to treat debt as a business proposition or do you think that it should be allowed to run on till you get into a state of slavery, practically?—What I mean to say is that the Punjabi moneylender has succeeded better than the local moneylender in his recoveries.

66,383. Because he is more businesslike?—Yes, because he is very strong.

66,384. Would you not like to see business methods established in co-operation in order to get prompt repayment?—Yes, I would insist on prompt repayment.

66,385. *Professor Gangulee*: Do we understand that you have been in charge of this movement for the past sixteen months?—Yes.

66,386. Who were your predecessors?—My immediate predecessor was the late Khan Bahadur Mohiuddin Ahmad who was in charge of the department for seven-and-a-half years.

66,387. Who was the Registrar when the movement was first started?—I think it was Mr. (now Sir Laurie) Hammond.

66,388. Was the present policy shaped by your predecessors?—Yes.

66,389. Have you made any appointments in the Central Banks since you came to hold charge of this department, appointments of managers and so on?—The system of recruitment is that applications are received by the Assistant Registrar and selections made with my approval, and the selected candidates are sent to Sabour for training. An examination is then held and on the results of that examination the successful candidates are given appointments.

66,390. Were the managers that you are now anxious to weed out appointed by your predecessors?—Yes.

66,391. From the point of view of the principles of co-operation, should there be any such thing as servant and master in the co-operative movement?—There is no such thing as servant and master.

66,392. Does not the motto 'Each for all and all for each' suggests that?—Yes, the movement is one as a whole.

66,393. On the board of management of the Central Bank you have representatives from the primary societies, have you not?—Yes.

66,394. How are they elected?—They are elected at the annual general meeting of the bank by votes.

66,395. On the one-man-one-vote principle?—Yes.

66,396. In answer to Question 5 (*a*), you say that you have in your fold only about three-and-a-half per cent of the agricultural families of the Province. Would you like to see an expansion of the movement, or would you like to strengthen your position before you expand, or would you proceed simultaneously?—I would proceed simultaneously.

66,397. What, in your view, are the chief handicaps to expansion? Do you think that illiteracy is one of them?—The provision of an adequately trained staff is the first item.

66,398. Would you consider illiteracy as one of the serious handicaps?—There is no doubt that it is a handicap, but it is not a serious handicap to the expansion of the movement.

66,399. The seed of co-operation fails to germinate on the soil of illiteracy?—Yes.

66,400. Do you think that bad communications in the rural areas are a handicap to the expansion of the movement?—No.

66,401. Could you give the Commission an idea of the status of a member of a society in the village. Has he a status in the village by virtue of his being a member?—I think he improves his status by becoming a member of the village society.

66,402. What is the procedure adopted before the formation of a primary society? Do you undertake any preliminary survey of the locality in which the society is to be located?—We do not make any actual survey, but we send out our honorary organiser, or some special officer, to preach the gospel of co-operation there, to find out whether they actually want a society or not.

66,403. For how long do you carry on that propaganda before you actually register the society?—Three or four visits are paid and that is all.

66,404. And the result of these visits is reported to you as Registrar?—The report is made to the Assistant Registrar who has got the powers of a Registrar to register societies.

66,405. You have divided your primary societies into several classes, *i.e.*, (*a*), (*b*), (*c*) and so on, and I find that about sixty-eight per cent of your societies come under class (*c*). What is the real standard there when you use the word average?—That is to say neither good nor bad.

66,406. And five per cent, in your view, are model societies?—Yes.

66,407. And fifteen per cent comes under class (*b*)?—Yes.

66,408. May we take it that fifteen *plus* five, that is, twenty per cent of the total number of societies thoroughly understand the responsibility attaching to liability?—Yes, there can be no doubt about that. The first two classes thoroughly understand it.

66,409. I think you suggested somewhere in your note that Government should pay for the auditing of the accounts of primary societies. Could you tell us why you make this suggestion?—Because I consider that under the Act this duty is imposed on the Registrar. Under Section 17 of the Act the Registrar is required to audit the accounts or cause them to be audited.

66,410. *Mr. Calvert*: But do not the joint stock banks pay for their own audit even under the Act?—Yes, they do. But the contention of

the Co-operative Federation is that if societies have to pay for the audit, then they should also control the audit staff.

66,411. *Professor Gangulee*: Is the Government aware of that point which has been raised by the Federation?—I do not know if the Government is aware of it or not, but the fact is that that point was raised several times.

66,412. It has been pointed out in the Administration Report of the Bihar and Orissa Government that one way in which improvement may be achieved in the case of primary societies is by the organisation of more guaranteeing unions?—Yes.

66,413. But I understood you to say that you did not believe in guaranteeing unions?—I cannot say that I do not believe in them, but guaranteeing unions have proved a failure from the way in which they have been run.

66,414. You believe in the organisation?—Yes, I do.

66,415. You think that if guaranteeing unions could be made effective, certain improvements might be achieved in the primary societies?—Yes.

66,416. What percentage of the total number of societies are now affiliated to guaranteeing unions?—We have got about 200 guaranteeing unions, and if each guaranteeing union may be said to have, on the average, about ten societies, then the number would be about 2,000 societies.

66,417. Would most of your (*a*) and (*b*) classes be affiliated to guaranteeing unions?—Not necessarily so.

66,418. In connection with this Federation have you a Development Officer appointed by the Federation?—Yes.

66,419. Could you tell the Commission whether he is a whole-time man or not?—Yes, he is.

66,420. Is he a paid officer of the Federation?—Yes.

66,421. What are his normal duties?—His main duties at present are to run the Sabour training class, and to edit the Federation Gazette. Then he is required to go about in the towns, not in the villages so much, in order to enlist the sympathy of the educated classes for the movement.

66,422. Who appointed this Development Officer?—The council of the Bihar and Orissa Federation.

66,423. Could you tell the Commission what is the relation of this Federation (which is essentially a propaganda organisation) with the Agricultural Department?—There is no relation at all.

66,424. What about their relationship with the Public Health Department?—There is none.

66,425. Does the Federation get any assistance from the departments of Public Health, Education, Agriculture, Veterinary?—The Federation does not receive any assistance from these departments.

66,426. Do the co-operative societies receive any assistance from these departments?—I may say that these departments carry on their propaganda through the co-operative societies.

66,427. Is there no point of contact between the Registrar of the co-operative movement and these departments?—There is a relationship between me and the departments.

66,428. Could you tell the Commission the nature of this relationship?—We help them in the propagation of their improved methods and practices.

66,429. That is rather vague; what is the precise manner in which you help them?—We carry on propaganda; we advise the societies and help the departments in getting things done.

66,430. Who are your actual agents?—The managers and the inspecting clerks, who are the paid officers of the Central Banks.

66,431. It has been pointed out in the Administration Report that some of the Central Banks show evident marks of deterioration; one of the reasons stated is that they are unable to collect their dues. Is that a serious one?—Yes, with some banks.

66,432. It has reference only to some banks. Another reason is internal dissension. Could you tell the Commission whether there has been any case of that kind?—In one of the banks two parties had sprung up and they were quarrelling between themselves.

66,433. Two political parties?—One of them was a political party.

66,434. Have you found a similar phenomenon in other banks?—No.

66,435. That is only a solitary instance?—Yes.

66,436. *Dr. Hyder*: Local dissensions or political parties?—One of the parties was a political leader; he wanted to capture the bank with a political motive.

66,437. *Professor Gangulee*: It is stated that lack of supervision has led to embezzlements by the staff; is that not a serious phenomenon?—That is a serious phenomenon.

66,438. Would you consider that lack of supervision is one of the chief reasons for these symptoms of deterioration?—Yes.

66,439. Then, take the loss through over-financing of societies; is that a serious one?—I think so.

66,440. Do you think it desirable that the Central Bank should fix a normal credit for each primary society?—The Central Bank does not fix it; the society fixes it.

66,441. I mean to say, the Central Banks should have a limit?—The Central Bank has got to fix its own limit.

66,442. It is done?—Yes.

66,443. Then, how does over-financing come in?—Over-financing was done in the past.

66,444. It is past history. I have not quite followed your answer on the question of the arrangement for the disposal of loan applications. Could you tell us how you proceed with the disposal of loan applications from the societies to the Central Bank?—The application is made to the Central Bank and then, as I understand it, the practice in the Central Bank is to call upon the manager to enquire, to look up the proceedings of the annual general meeting of that society, and then to report whether the amount of loan applied for is within the normal credit or not, and whether the loan should be given or not.

66,445. What is the longest period for which a loan is granted?—At present it is three to four years.

66,446. That is the limit?—Yes.

66,447. How are the terms of repayment fixed?—They have to pay in annual instalments.

66,448. If they fail to pay?—Then the *kist* is revised.

66,449. What is the security on which the Central Banks grant loans to primary societies?—The unlimited liability of all the members; sometimes they also take collateral security.

Rai Bahadur Durga Prasad.

66,450. Will you express your views on the Usurious Loans Act?—At present there is no limit fixed under the Act; it is left to the courts to decide what rate of interest should be paid. That is the Act as it stands, is it not?

66,451. Yes; is that Act known amongst the people here?—I do not think it is sufficiently known.

66,452. Is it applied at all in the courts?—I have no information on that point.

66,453. I do not quite understand what is the main objective you hope to achieve in adult education. Could you tell us?—To remove illiteracy as much as possible.

66,454. On the question of your A class societies, do you find amongst the members a tendency to go to courts?—There is very little litigation amongst the members of our societies. We try to stop it, and we have succeeded in stopping it.

66,455. Is that done by propaganda or any other means?—We come to know of it and the manager goes out, collects the members together and tries to bring about an amicable settlement.

66,456. That is done by arbitration?—Yes.

66,457. Through the influence of the honorary workers?—Sometimes through the influence of the honorary workers. The directors go out and have the matters settled.

66,458. Are you familiar with the district boards?—Yes, to some extent I am.

66,459. In answer to Question 4 (*c*), you tell us: "The want of proper roads in the villages is a great handicap and district boards should be made to remove it." Do you think that the district boards will like that phrase 'made to remove it'?—Why not? For what purpose do they exist?

66,460. Do you think Government should bring pressure to bear on the district boards in this matter?—I should think so.

66,461. What is the usual rate of interest charged by the ordinary moneylenders?—As I have said, in the case of cash loans it is twenty-four per cent now: it used to be much more in the past.

66,462. Do you find any change in the rate of interest as a result of the expansion of the co-operative movement?—Yes, a great change.

66,463. *Dr. Hyder*: Referring to the Hazaribagh and Palamau districts, are you aware that cultivators who borrow cattle have to pay for hire for one season's use only, the price of a good bullock?—I know that the rate of interest in those districts is very much higher than in other districts.

66,464. The activities of your department have not lowered the rate of interest there?—We have not got many societies in those districts.

66,465. *Mr. Kamat*: Would it be right to say, on a consideration of your replies, that the weakness of the policy of the co-operative movement in this Province has been the multiplication of the Central Banks or primary societies without taking the precaution to train men either for staffing the banks and societies, or for doing banking work?—Yes.

66,466. You are now having a legacy of this policy on your hands; how long has the policy been in existence?—For the last ten years.

66,467. You are now turning over a new leaf and adopting a new policy introducing one or two new principles which you have stated?—I hope so.

66,468. You state that in certain places the rate of interest which moneylenders in the village charge is sometimes lower than the rate of interest charged by the co-operative societies, and that this hampers the growth of societies?—Yes.

66,469. How long have you been maintaining a higher rate of interest in the societies than the local moneylender's rate of interest?—I have received various reports from sub-divisional officers and others who inspect the societies. I think this state of affairs has been in existence now for the last two years. In some of the villages the prevailing rate of interest has been reduced and it is now only about ten or twelve per cent (not more than twelve per cent), whereas we are still charging Rs. 15-10-0.

66,470. If this has come to your notice could you tell us what steps you have taken, or propose to take, to revise the policy?—In some of the Central Banks I have already countenanced the reduction of the rate of interest.

66,471. What subsidy are Government giving to the Federation?—I have mentioned in my note the subsidy that the Federation receives for auditing. In addition to that the Development Branch gets Rs. 7,500.

66,472. How much does the Federation expend on propaganda as such? Can you give a rough idea?—The Development Branch spends annually about Rs. 40,000.

66,473. That is for your department as such?—Yes.

66,474. I am speaking of the amount spent by the Federation on propaganda, if any?—This Development Department has been in existence only for the last two years, and up till now we have been employing only one Development Officer and issuing one English magazine and two vernacular magazines (one in Hindi and another in Oriya); we have now strengthened the department and we have one Development Officer and five propaganda officers.

66,475. Can I take it then that two years ago there was no emphasis laid in this Province on correct propaganda, educating the public on the right principles of co-operation?—Yes, to some extent.

66,476. You have awakened to the necessity of correct propaganda only within the last two years?—Yes.

66,477. *Mr. Danby*: After granting a loan to a society, does the manager of the bank make any enquiries to ascertain whether the money has been used for the purpose for which it was asked?—When he goes to the society to inspect, he makes enquiries whether the loan has been used for the purpose for which it was taken. Either he enquires himself, or the inspecting clerk enquires if he goes out.

66,478. You told the Chairman that, as a rule, the loans were granted within a fortnight of the application?—Yes.

66,479. My experience is that, as a rule, it takes two months or longer before loans are granted?—In some cases it may take that time. If it is a loan for a heavy amount, and some additional enquiries have been ordered by the working committee of the board of directors, then it takes longer.

66,480. There have been a number of cases, I believe, where members of a society have taken a loan from the bank at fifteen per cent, and again lent it out themselves at twenty-four per cent?—I do not know of any cases like that. I have not heard of them.

66,481. *Mr. Calvert*: In the previous year's report, reference is made to your distributing home safes. Has that proved successful?—Yes, it has met with a certain amount of success.

66,482. It is very encouraging?—Yes, it is encouraging.

66,483. *Professor Gangulee*: In answer to Mr. Kamat you stated that this propaganda work is just two years old, and you also have broken new ground by starting a new society in Khunti. Could you tell the Commission what is the nature of that work? Is it village welfare?—The Khunti society is a new venture. It undertakes all work of village improvement. For instance, they have opened a school, they have introduced improved sugarcane and groundnut, and they are doing it on the basis of joint farming. They have built a well, and they have also provided a building for the school. I am told that they have now opened a recreation club. They have also made their own roads.

66,484. This work of all-round rural uplift was done on the initiative of the villagers themselves?—Yes, with propaganda work on the part of the officers of the Khunti bank, particularly the honorary organiser of that area, Babu Tara Prasanna Ghose.

(*The witness withdrew.*)

Mr. DEVAKI PRASAD SINHA, M.A., M.L.C., Patna.

Replies to the Questionnaire.

INTRODUCTION.

The Royal Commission on Agriculture has excited high hopes in the minds of those who have found that, in the turmoil of political agitation, Government have of late abandoned all interest in agriculture which is the chief industry of India. The present unrest which is visible on the surface of our society has its roots deep down in the economic degeneration of the millions of India's poor. It is a pity that while in the early stages of British administration in India, Government considered it necessary to confine its activities chiefly to the economic development of the country, at the present moment they are only busy in evolving formulas intended to placate and pacify the politically-minded section of the population. It has also been noticed that, in recent years, the policy of Government has been to give protection to all the subsidiary industries of India at the cost of the agriculturists who have ultimately to bear the burden of all commitments involved in the acceptance of a policy of protection. Would it be too much to hope that this Commission will induce Government to extend its protection to the principal industry of Indian agriculture, which is sorely in need of protection?

QUESTION 1.—RESEARCH.—(*a*) The question of research can be classified under three heads:—

(1) Research proper;

(2) testing and verifying the results of researches in the field; and

(3) propaganda by demonstration and other methods.

The utility of the last of these functions seems obvious and anything done by the Department of Agriculture in this direction is easily appreciated and generally recognised. But it is equally obvious that research and experiments constitute the basis of propaganda. In the domain of agriculture, *a priori* ideas and methods that are

theoretically sound have to be examined in their application to the varying conditions of weather, soil and habits of the people. In a country like ours, unsuccessful demonstration destroys confidence for a long time, and even those experiments that have proved successful have to be presented in a form sufficiently attractive to dispel suspicion and to counteract the force of superstitious adherence to old and accepted ideas

For the proper organisation of agricultural research, it would be necessary for each Province to possess a complete staff of scientific experts and to undertake all the three functions enumerated above. But we have to work under great limitations and in the present state of financial stringency an ambitious scheme of agricultural development is not likely to secure the support of those who have to pay for such schemes. Besides this, the Department of Agriculture has in this country been run only as any other department of Government,—with plenty of red-tapism. Men with ideas who have so far served in the Department of Agriculture have had very little opportunity for displaying their initiative and powers of organisation; at every stage, they have been hampered by the inelastic rules and circular orders framed by Government. It is for these reasons that the Agricultural Committee appointed by the Government of Bihar and Orissa in 1921 recommended that the Agricultural College at Sabour should be closed. As a member of this committee, I was a party to this decision and I think our Province even now is in no mood to bear the burden of a full-fledged institution for agricultural research. I therefore think that the Provinces should for the present confine their attention mainly to the last two of the functions enumerated above, namely, experiment and propaganda. This does not mean that research should be totally banned. Research into questions that are of purely provincial interest will undoubtedly have to be undertaken by the provincial institutions, but the chief institution or institutions for carrying on research should be run by the Government of India.

In this Province I recommend that we should have seven or eight agricultural farms in different divisions, which should form the centres of the activities of the Department of Agriculture. These farms should concern themselves chiefly with experiments for testing the results of research carried on in the institutions maintained by the Central Government. In the light of this research and experiment the Provincial Governments should organise widespread propaganda for spreading the results of research and for inducing the agricultural population in the country to adopt improved methods of agriculture.

Research into fundamental problems applicable generally to the country should be carried on at the institutions maintained by the Central Government. These institutions should be on the model of the Pusa Research Institute and the ultimate aim should be to establish one such institute in every Province in India. My recommendations would mean that institutions for research into agricultural problems should be at the charge of the Central Government, while the Provincial Government would be left with the task of subjecting to experiment the results of the research carried on at these institutions, and of distributing the knowledge gained in a systematic manner.

There should be a Central Board of Agriculture for the whole country to co-ordinate and regulate the activities of the Provincial Governments. On this board there must be representatives from the

different Provinces of India and the meetings of the board should be held in rotation in the different Provinces of the country. The board should receive regular grants from Government and, if necessary, the finances of the board should be supplemented by the imposition of a small tax on agricultural products exported from the country. The finances of the board should be separated from the general finances, so that it may be free to organise a programme of development. Any balance at the end of the financial year should not be allowed to lapse. The provincial boards of agriculture, where they exist, should be reorganised in such a way as to include a representative from each of the different districts in the Province.

Veterinary research should be organised in a similar manner and should be carried on hand in hand with research into agricultural problems. The question of the different forms of disease prevalent among the cattle of different districts and the causes thereof should be carefully studied.

Research into the scientific value of indigenous and traditional methods of agriculture is necessary only with a view to ascertaining if there is any fallacy in them. These indigenous theories and traditional methods have worked successfully for hundreds of years and their utility cannot generally be challenged. Even to-day in our Province some of the most fundamental rules for the guidance of the agriculturists are contained in couplets composed by a poet, called Ghagh, who flourished hundreds of years ago.

(*c*) Research in soil chemistry would be very helpful. Different kinds and classes of soil should be analysed with a view to finding out remedies for improving their fertility. Farms should be organised like hospitals so that cultivators can take a clod of earth from their fields, get it analysed by experts who would diagnose the diseases in the soil and prescribe remedies which cultivators themselves may apply and thereby improve the fertility of the soil. Among other subjects for research, I recommend the discovery of cheap labour saving devices, easy methods of irrigation, and the possibility of improving the ordinary ryot's existing agricultural implements. For this Province in particular I would also suggest research into the causes and the means of prevention of the insect pests in the Mokameh Tal.

QUESTION 2.—AGRICULTURAL EDUCATION.—The question of agricultural education can be considered under several heads. They can be broadly classified into:—

(*a*) Education given in agricultural institutions.

(*b*) Agricultural education given in ordinary educational institutions.

(*b*) For the rural areas I think agricultural schools would be costly and unpopular. What is necessary is to give an agricultural bias to our rural education so that everybody who receives such education may know something about agriculture. In India, there is no agricultural class or caste; men of all classes have some interest in agriculture and it is necessary that everybody should know something about it.

In the rural schools where primary education is given, students should be taught the general principles of agriculture. It would be both impracticable and unnecessary to maintain either school plots or school farms in every primary school; the requirements of these institutions can be met by organising field excursions. Students should be allowed to see how agricultural operations are carried on.

In secondary schools agriculture should be adopted as one of the optional subjects, so that the marks obtained by students in this subject may be added to make up the total number of marks which determine his position in the class. As a large number of students from the rural areas receive education in secondary schools, this subject is bound to prove very attractive. Every secondary school, as far as possible, should have a farm attached to it in the same way as there is a football ground or gymnasium. The students should be given opportunities for an intelligent appreciation of the methods of agriculture. They ought to be made to enquire into the why's and wherefore's of agricultural methods.

I would not recommend an establishment of a special agricultural college, but I do recommend that agriculture should be taught as one of the science subjects in some of the principal colleges of the Province.

In this Province, for example, agriculture may be taught as one of the subjects for the I.Sc. and B.Sc. classes in the Patna College, and in the colleges at Muzaffarpur, Hazaribagh and Cuttack. These colleges should also have farms attached to the agricultural classes like laboratories. Students who are found to display special aptitude in agriculture should be sent up for post-graduate studies and research in one of the institutions maintained by the Government of India, such as the college at Pusa, or to a foreign country, like America or Denmark. In this way, higher studies in agriculture would be encouraged and we should soon have a group of specialists in the subject. I would also recommend that a faculty of Agriculture should be established in each of the universities in India. The result of these recommendations would be to drag agriculture out of the oblivion of pedantic study and to dispel the prevailing notion that agriculture is a discredited profession.

As I have said above, there is no necessity to maintain institutions purely for agricultural education, but the provincial farms should undertake the following educational functions:—

(*a*) Educating skilled farm-labourers (in this Province known as *kamdars*) who may be sent out to show cultivators how to make use of improved methods of cultivation;

(*b*) giving short-period courses in agriculture to persons who may be desirous of getting into touch with improved ideas The men who would receive instruction for this purpose would be either zamindars or sons of zamindars or agriculturists who may subsequently find employment either as managers or assistant managers on agricultural estates. Such men should be given certificates in the same way as certificates are issued by the St. John's Ambulance Association to persons who have received training in 'first aid' methods.

(*c*) educating demonstrators, propagandists and agricultural instructors who may be employed by the Department of Agriculture for carrying on its work.

(v) and (x) The main incentive which induces lads to study agriculture at present is to secure employment in the agricultural departments. As the number of such posts is very small the incentive consequently becomes weak. One of the most effective methods of making agriculture attractive to middle class youths would be to make rules that, in the selection of executive officers, Government

should give special preference to students who have studied agriculture. As a matter of fact, executive officers who have to discharge the duties of *butwara* officers, communication officers, *khas mahal* officers, land registration deputy collectors and even sub-divisional officers, badly need education in agricultural problems and conditions. Hundreds of students who study in colleges are actuated by the ambition to secure about a dozen of the executive posts which fall vacant every year under Government. If each of these aspirants studied agriculture, we would every year have hundreds of students learning agriculture in colleges.

(xii) Adult education in rural tracts can be popularised only through evening schools maintained under public supervision for the purpose of giving instruction to those who have entered upon agricultural occupations. Such schools must be maintained and run in accordance with the plans adopted by the Board of Agriculture from time to time. Schools like these, I understand, work very satisfactorily in the United States of America, where they are established under the provisions of the Federal Vocational Education Act. There is no reason why, with proper organisation and propaganda, this kind of school should not succeed in India.

(xiii) These evening schools should be under the management of those district boards which can be induced to finance such schools themselves. It is possible that some district boards may require special grants from Government for this purpose.

(iv) and (vi) The existing institutions for agricultural education are not popular for the reasons stated above. It is not possible to stimulate demand for instruction in purely agricultural schools in rural areas. In India there is no agricultural class or caste; all classes have something to do with agriculture.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) and (*b*). My views on this subject are contained in a note which I appended to the report of the Agricultural Committee of Bihar and Orissa in 1921, from which I may be permitted to quote an extract: "I desire therefore to emphasise the extreme importance of propagating the results of experiments in the ryot's field. I do not quite agree with the view expressed at page 3 of the report that there should be a net-work of sub-divisional farms. This experiment would be very costly and of doubtful utility. The ryots would not, I think, take the trouble of visiting farms, whether they are small or big, and obtaining practical lessons there. Besides this, occasional visits to farms will not be of any great use if they do not keep themselves attached to the farms for days—possibly for months. Even ryots living near a flourishing farm such as that at Kanke have derived very little useful knowledge from the farm. On the other hand, ryots have been found more and more anxious to see experiments carried out in their own fields, and wherever these have been carried out, the results have strikingly stimulated them to carry on cultivation on similar lines. The reasons are obvious. They think, and rightly too, that Government spends very large amounts in increasing the quantity and improving the quality of a particular crop which they cannot possibly afford; they also think that the methods adopted by Government are so complicated and costly that they cannot possibly be adopted by them. But when in their own fields and before their own eyes an improved method of cultivation or any improved seed is tried from day to day, and when at the harvest they find the cutturn doubled, it gives them reason to ponder seriously. They calculate the increased cost and find that it is

nothing compared with the value of the outturn. They realise thereafter that there is nothing mysterious or complicated in the process adopted. The phenomenal success of *Dahia* paddy in the Banka sub-division and of groundnut in the Nawada sub-division is due to demonstration carried on in the ryot's field. In the Madhipura sub-division there was no farm to demonstrate the Pusa wheat No. 12 or the *Indrasail* paddy; both were tried in the ryot's field and now they have become extremely popular; ryots are preserving the seeds from year to year and spreading them".

(*c*) Propaganda can also be very effectively carried on by means of cinemas and pictures especially prepared for the purpose. We get general meetings organised in the village bazaars that are held weekly in different localities. If on the evenings of such bazaar days these pictures are exhibited they will have great effect. Leaflets at present are not of much use owing to the prevalence of illiteracy; they are distributed to and are of use only to the upper strata of village society, people who have a tendency to develop absentee landlordism. Posters and charts may be of some use.

At fairs and exhibitions it is not possible to do much propaganda work because people are otherwise occupied; but if agricultural fairs and exhibitions can be organised in different parts of a Province they will be able to attract some attention.

Propaganda, in order to be effective, must be carried on by persons who combine a scientific knowledge of the subject with an appreciation of the sentiments of the people among whom they have to work and a knowledge of the local conditions. Officers who are entrusted with propaganda work must learn to live with the people so as to inspire confidence, otherwise their work is not likely to be effective; they must endeavour to associate with themselves some prominent local people.

QUESTION 4.—ADMINISTRATION.—(*a*) As I have indicated in my answer to Question 2, research work should be in charge of the Central Government, while the Provincial Government should mainly concern themselves with the distribution of knowledge gained from research and experiment. This does not, however, mean a watertight division of functions; it is merely an indication of the way in which responsibility should be distributed. The Government of India must also co-ordinate the activities of the various Provincial Governments so that one Province may profit by the lessons of the others.

(*b*) Agriculture being a Transferred Subject, there is at present a tendency to limit almost all appointments to men of the Province. This narrowmindedness is not conducive to the development of agriculture or of any other science. Higher appointments, at any rate, should be under the control of a central agricultural board, so that, where necessary, men of one Province may be utilised in another.

(*c*) The Agricultural and Veterinary services at present are not as useful as one would like them to be. The reason is that they regard themselves merely as part and parcel of a bureaucracy; they must learn to behave like public servants inspired with a genuine interest in the development of agriculture. Railways and steamers, posts, and telegraphs are performing very useful services; but the development of agriculture is considerably hampered by the absence of roads in most parts of the country. In the Chota Nagpur division some extensive tracts of land are untouched by roads and in my own district of Palamau some of the good roads are rendered useless in certain months of the year for want of bridges. The absence of roads compels agriculturists to depend upon middlemen.

QUESTION 5.—FINANCE.—For the better financing of agricultural operations, I would suggest the establishment of agricultural banks which would advance money to agriculturists on the security of their agricultural holdings or their standing crops. These banks, if properly organised, will prove to be very useful institutions in the country and will save poor cultivators from the hands of usurious moneylenders and exploiters. At present, crops are sold even before they are ready and the agriculturists' interests are mortgaged for several years in advance.

The Co-operative Department is doing some work, but owing to its activities being diffused, the banking business of this department is not successfully managed and many co-operative societies have had to suffer loss in their transactions. I do not think much of the *taccavi* loans.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) Different causes induce different classes of agriculturists to borrow money. The poorer sections, such as agricultural labourers and those who cultivate their own soil, are compelled to borrow because their agricultural income is not enough to meet the bare necessities of their family. Often they have to resort to the moneylender even for meeting the demand for food and clothing as also for the renewal of their agricultural operations. To these may be added the ill-timed demand of the landlords for rent and dues which they often attempt to realise in advance. Among the better classes of agriculturists, namely, the big tenants and the zamindars or landlords, the chief causes of borrowing are litigation and social ceremonies, such as marriages and performance of religious rites.

There are, however, certain causes of borrowing that are common to all classes of agriculturists. Some of these may be mentioned here:—

(1) Owing to our laws and customs the family of an agriculturist is usually a large one and every member of the family has to depend upon the slender source of income which an agriculturist possesses.

(2) Our agriculturists, who are generally very conservative, are often inspired by very foolish desires to achieve social distinction by unnecessary display of grandeur on certain occasions, without any regard to their financial position.

(3) The income from agriculture is uncertain. The agriculturists often count their chickens before they are hatched and thus court disappointment and deception.

(4) Debts once contracted breed more debt and the agriculturist thus gets involved in a ring of debt from which he finds it difficult to extricate himself. The original debt is often inherited from his ancestor.

(ii) The chief sources of credit for an agriculturist are his capacity to labour, his honesty and his timidity, and the assets which he may possess.

(iii) The chief cause which prevents the repayment of a loan is the high interest at which it is taken. The pressing need for money makes a borrower forget his incapacity to meet the demands of his creditor. Even when an agriculturist has sufficient money in hand he is led to spend it in other directions instead of utilising it in repaying his debt.

(*b*) I would very strongly recommend the application of the Usurious Loans Act and would go so far as to suggest that all interest higher than twelve per cent per annum should be disallowed by law. Unless some such drastic measures are taken it will not be possible to stop agricultural indebtedness which is the chief cause of the economic degeneration of our agricultural population. If, as suggested above, agricultural banks are established and branches organised in different parts of the Province, borrowing purely for business purposes would be regulated and the unscrupulous usurers who, like so many vultures, infest our villages would be virtually eliminated. It is not necessary to adopt special measures to deal with rural insolvency or to facilitate redemption of mortgage.

(*e*) It would be very unwise to restrict or control the right to sell, but mortgages may be limited to some extent.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—I think a good deal of fuss is unnecessarily made over the question of fragmentation of holdings. To some extent fragmentation is unavoidable and any proposal to stop fragmentation by law will mean sweeping changes in social customs and laws. I would leave this question to be settled by the operation of economic laws. If some step is taken to reduce the undue pressure of population upon the land, fragmentation of holding would be curtailed. Fragmentation is at present an inevitable evil and I am afraid that any remedy which laws can enforce would be worse than the disease.

QUESTION 8.—IRRIGATION.—The laws relating to irrigation need to be thoroughly overhauled. Irrigation must be taken away from the control of the zamindars and entrusted to the care of an irrigation board for different districts, sub-divisions and localities, which may be constituted according to a new law which I recommend for the purpose. The control of irrigation in the hands of private individuals is often a weapon for oppression of the poor. I know several instances in which zamindars have neglected irrigation with a view to wreaking vengeance upon refractory tenants. There are several zamindars who would much rather waste their water than allow others to profit by it.

In our Province there exist two laws relating to irrigation. They are known as the Bihar and Orissa Minor and Private Irrigation Works Acts of 1922. But up to this time no work has been carried out under the provisions of these Acts. It is necessary that comprehensive legislation on the question of irrigation should be introduced so that irrigation may become a public rather than a private concern; failing this, we should pass laws enabling the State to enforce irrigation schemes where considered necessary in public interest.

QUESTION 10.—FERTILISERS.—(*c*) New and improved fertilisers should be popularised through the agency of the village schools and post offices and the propagandists and demonstrators sent out by the Agricultural Department. Literature dealing with the subject should be widely distributed and special depots for its sale should be maintained by each co-operative society in the village. The village markets should also be made use of in popularising these fertilisers.

(*f*) The use of cowdung as fuel can only be discouraged by the introduction of coal in the farthest corners of the country. This can only be done by a proper development of communications and transport; otherwise coal is too expensive a substitute.

QUESTION 14.—IMPLEMENTS.—Improved agricultural implements are at present too costly to be widely adopted. Efforts should be made to induce manufacturers to supply cheap agricultural implements.

Arrangements should also be made for the sale of agricultural implements on the hire-purchase system. Co-operative societies should be induced to keep in stock improved implements that are too costly to be purchased by individual cultivators. These implements may be let out on hire to members as well as to non-members when they are required.

QUESTION 15.—VETERINARY.—(*a*) I think it is unnecessary to maintain the Agricultural and Veterinary departments as independent bodies. If the Director of Agriculture has control over both, it will be more economical, and the activities of the two departments will be better co-ordinated.

(*b*) (i) Yes.

(ii) No.

(iii) This is unnecessary. The Provincial Government should have special powers to control and scrutinise.

(*c*) (i) No. There can be no improvement until the services of veterinary surgeons are available freely to all concerned. At present the indigenous remedies are resorted to by the villagers, because they are cheap and are easily available.

(ii) No.

(*d*) Legislation would be of no use. Propaganda and persuasion would improve the existing conditions.

(*g*) and (*h*) Research should be made into the indigenous method of treating those diseases; the old method should be supplemented rather than discouraged.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) Cattle in the major portion of this Province are in a very miserable condition and it is very necessary to improve the breeds of livestock. This can be done only with the help of influential men of the village, and by the district and the local boards; but success in this direction depends upon the existence and maintenance of good dairy farms. These farms can only be run by co-operative societies.

(*b*) Overstocking of common pastures does exist. It is necessary to regulate pasture lands by law. Insufficiency of dry fodder in certain areas is due to want of arrangement for silage making.

(*c*) In my district April, May and June are the months when fodder shortage is felt most.

(*d*) Maintenance of silos by co-operative societies.

(*e*) Landowners cannot be induced to take practical interest unless they are forced to do so by law.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) In general a cultivator is busy on his holding for a period of six to eight months, interspersed with days of idleness. The extent of his employment on his holding depends upon the nature of the soil and the area he holds.

In the slack season the well-to-do agriculturist is busy attending weddings and spends some time in litigation. They often go on pilgrimages and visit relations. Those of the poorer class occupy themselves in subsidiary industries, such as, the work of palanquin bearers, selling jungle products like fuel, leaves, etc. Some of them migrate to towns for domestic service, others go to industrial centres, railways, mills, mines, etc., for seasonal work. The *jolahas* take to weaving and the blacksmiths ply their own trade. Repairs of houses are done mostly during the slack season. The well-to-do agriculturists often spend their time in unhealthy amusements.

(*b*) Subsidiary industries can only be adopted if there is an appreciable increase in the standard of life. Among the subsidiary industries which can be established with Government aid I would suggest dairy farming, the manufacture of matches and splints, and fruit growing.

(*c*) The chief obstacles are the want of a ready market, difficulty of transport and scarcity of capital for investment. To these may be added the conservative instincts of our people which prevent them from taking to any occupation other than that sanctioned by traditional usage.

(*d*) Yes. Government should also stimulate and encourage co-operative societies to start such industries.

(*e*) It would not be possible to induce industrial concerns to move to rural areas because of transport difficulties and distance from markets. There are some industries, however, which may be established in rural areas touched by roads. These are the manufacture of shellac and catechu in Chota Nagpur.

(*f*) This is not necessary. There are already enough materials for the purpose.

(*g*) Transport facilities and organisation of markets.

(*h*) Rural clubs and gymnasia would be very useful for this purpose. Occasionally there should be competition in sports and games.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) and (*c*). This is a very difficult thing to do. It can only be done by a proper organisation of labour unions in rural areas. No effort has so far been made in this direction, but I believe if such unions were properly organised they would not merely effect an equitable distribution of labour but would also improve the quality of agricultural labour.

(*b*) Shortage of agricultural labour is spasmodic in nature. At certain periods there is shortage; at other times agricultural labour is plentiful. This is due to want of organisation.

QUESTION 19.—FORESTS.—(*a*) Forest lands at present are very badly used. All schemes for the reservation and protection of forests by Government are very unpopular and cause great hardship to the poorer section of the village. The advantages proceeding from the preservation of forests are not realised by our people and will not be realised until the reserved and protected forests are managed with the help of local men. Forest guards often find it a profitable source of illegal gratification, and schemes for reservation of forests are adopted without any regard to convenience or utility.

(*b*) I suggest the afforestation and cultivation of waste lands. At present cultivation of grass for fodder is almost unknown in the villages.

(*c*) This is a very doubtful question and has not as yet been tested by practical results. One of the ways of preventing damage from floods is the opening up of passages for the flow of water through the ridges on which railway lines are laid.

(*e*) There are plenty of openings for schemes of afforestation in Chota Nagpur.

(*f*) No.

QUESTION 20.—MARKETING.—For agricultural products I cannot say that there is a want of markets, because many products are sold in advance. The exporters and their agents have extended their activities far and wide. What is necessary is an organisation of

markets on co-operative lines so as to prevent agriculturists from being at the mercy of *banias* and middlemen. The average agriculturist is hopelessly ignorant of market price variations. The prospects of rise and fall in the supply of commodities produced by Indian agriculturists is appreciated better by the firms in Calcutta and New York than by the agriculturists themselves. If possible, Government should distribute, *gratis*, information and intelligence regarding market price variations.

QUESTION 21.—TARIFFS AND SEA FREIGHTS.—I am strongly of opinion that protective tariffs in the present state of the country adversely affect the interests of the cultivator. A rise in price artificially brought about in the interest of a few wealthy and influential industrialists is no sign of prosperity for a country in which rise in wages is very slow indeed.

QUESTION 22.—CO-OPERATION.—(*a*) The co-operative movement at present benefits only the upper strata of village society. Those in charge of co-operative societies avoid the association of the poorer sections. What is called the *bhadralog* (well-to-do) class in rural society considers it expedient to keep the poorer men in subjugation and to prevent them from becoming thrifty or educated. It is the duty of Government officers in this department to see that the co-operative movement embraces the poorest of the poor.

(*b*) (i) Credit societies are more popular than any other co-operative societies. They have done some useful work but their success depends considerably upon the business morality of their members. Loans are at present given indiscriminately and influential members succeed in getting the lion's share. Attempts should be made to distinguish loans for agricultural purposes from loans for other purposes. The former should be encouraged. Societies should also try to induce the habit of making payments by cheque as this would prevent unnecessary transfer of cash.

(ii) and (iii). I would like to see more of these societies in our villages.

(iv) to (viii). These societies are very rare. Attempts should be made to popularise them as much as possible and to devote much greater attention to them than has been given in the past.

(ix) I would suggest the establishment of co-operative hospitals and co-operative dairies.

(*c*) Yes.

(*d*) Not much.

QUESTION 23.—GENERAL EDUCATION.—(*a*) The net result of all education given at present is to make agriculture a discredited profession. Even those young men who have ample opportunities for doing successful work in agriculture take to the profession of clerks and migrate to towns where they spend a miserable life in the false hope of passing for respectable citizens.

Agriculture has been entirely neglected and left in the hands of those who are considered too ignorant and lazy to find other occupations. I know of many cases in which parents have regretted having given education to their children. Many boys after receiving education can neither be induced to take to the agricultural profession nor can they find any other employment.

(*b*) (i) All education should be given an agricultural bias, and agriculture should be given a respectable place in the curricula: The study of agriculture should also be recognised and appreciated by Government.

(ii) Primary education must immediately be made compulsory in rural areas. No improvement is possible without this.

(iii) Early marriage and the necessity of earning a livelihood.

QUESTION 24.—ATTRACTING CAPITAL.—(*a*) Advertisement and giving special facilities.

(*d*) The present system of land tenure prevents owners of agricultural lands from carrying out improvements. Also, cheap methods of improvement are not yet known to our agriculturists.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) I have two things to suggest. Firstly, energetic efforts should be made to improve the conditions of life in villages. At present village life seems uninteresting and miserable and the growing tendency to resort to towns and cities has proved a great menace to the welfare of our rural population. Secondly, I would suggest that the existing pressure on the land should be relieved by adopting schemes for colonisation. I would respectfully urge this Commission to secure some foreign land which should be exclusively reserved for Indians to colonise, so that there may not be any fear of a clash of colour.

(*b*) Such enquiries may be conducted under the direction of Government by officers and by amateurs such as college students. The Chanakya Society in the Patna College has already done useful work in this direction and their enquiries should be encouraged by Government.

QUESTION 26.—STATISTICS.—Very little has been done in this direction. The recommendations of a committee appointed by the Government of India two years back under the presidentship of Sir M. Visvesvaraya are still lying in the dust of the Secretariat shelves. It is very necessary to collect reliable statistics and disseminate information in the form of leaflets and charts.

In conclusion, I would suggest that the Government of every Province should form a development board which would be in touch with the activities of the Agricultural, Veterinary and Co-operative departments and make proposals for improving the economic conditions of our rural areas. The rural population is the backbone of our society, but no one at present seems to take any interest in the fate of our villagers.

Oral Evidence.

66,485. *The Chairman*: Mr. Devaki Prasad Sinha, you are a member of the Legislative Council in the Province of Bihar and Orissa?—Yes.

66,486. In reply to Question 1 (*a*), you say "Men with ideas who have so far served in the Department of Agriculture have had very little opportunity for displaying their initiative and powers of organisation; at every stage, they have been hampered by the inelastic rules and circular orders framed by Government." Would you tell us what you are thinking of when you say "they have been hampered by the inelastic rules and circular orders framed by Government"?—What I meant was that the rules which regulate expenditure in this department are almost the same as the rules which regulate expenditure in other departments, such as Revenue and Excise departments. The Agricultural Department, if it has to undertake a new project, or even if it has to make a small appointment carrying with it a salary of thirty or forty rupees, has to go up to Government, according to the rules prescribed for the department. In that way,

a lot of time is taken up, and in some cases sanction comes after the opportunity has passed away. That is why I have used the word " red-tapism."

66,487. Another way to meet that difficulty, and at the same time to maintain the principle of ministerial and administrative responsibility, would be to have some form of imprest fund, which would be available for the immediate payment of small sums. Is that your idea?—That is one of the ways. Another way would be that a responsible body should be entrusted with a certain amount of money for expenditure on the department, and that body should be such as to inspire confidence in those who have to pay for it. I have, later on in my note, suggested the establishment of development boards, which would include representatives of the non-official members of the Council. I should think that if expenditure is incurred with the sanction of the development boards, which would be like executive committees for these departments, any responsibility taken by them would meet wih the approval of the Council much more easily than otherwise.

66,488. A development board for supplying funds to carry out particular experiments?—Yes.

66,489. As I understand your answer to Question 1 (*a*), what you want to do is to devote your agricultural farms to the function of experiments and demonstrating the results of the experiments on the cultivators' own holdings?—The second part of your question is dealt with in answer to Question No. 2. As for the first part, I have indicated in my answer that, keeping in view the present financial position of the Provinces, particularly this Province, research work should be left in the hands of the Central Government and demonstration and propaganda should be carried on principally by the Provinces.

66,490. I had that in my mind. I note that you wish that all fundamental research should be in the hands of the Central Government. But a certain amount of local experiment is inevitable, for instance, to test the suitability of local conditions and soils to particular crops; that has to be done in the locality?—I have indicated in my answer that there are three stages through which work has to pass. There is the research stage, the experimenting stage and propaganda; the last two will be undertaken by the Provinces and the first by the Central Government. That is an arrangement which I have advocated on account of the financial difficulties of the Province. I would very much like to see a full-fledged research institute in every Province, but I think, under the present financial conditions, it is an impracticable ideal.

66,491. In answer to Question 4 (*b*), you say: "Agriculture being a Transferred Subject, there is at present a tendency to limit almost all appointments to men of the Province. This narrowmindedness is not conducive to the development of agriculture or of any other science. Higher appointments, at any rate, should be under the control of a central agricultural board, so that, where necessary, men of one Province may be utilised in another." You see some danger that this tendency to limit appointments in a Province to persons resident in that Province may seriously reduce efficiency?—I do.

66,492. It is natural enough for local public opinion to desire that local men should be appointed?—Parochial patriotism demands that, but I think that in the interest of research and the advancement of the cause of agriculture, it is necessary that we should get the best men wherever they are available.

66,493. I have not the least doubt you are right, although naturally, of two men of equal capacity and qualifications one would prefer one's own fellow-provincial?—Undoubtedly.

66,494. Your note on finance is quite clear, except where you talk about agricultural banks. What type of agricultural banks are you thinking of there?—My idea is that there should be one definite institution where loans would be available to agriculturists.

66,495. Do you mean long-term loans or short-term loans?—Mostly short-term loans, but in some cases long-term loans. At present what happens in our Province is this: Any agriculturist who has to borrow money has to depend, in the first instance, upon private creditors and usurers, and secondly upon the Co-operative Bank; in some cases he gets loans under the Land Improvement Act, and he also gets what are called *taccavi* loans. My suggestion is that instead of there being so many loan institutions we should have agricultural banks, with branches extending to different districts, from which agriculturists could borrow money on sufficient security whenever they require it.

66,496. Would not an agricultural bank, meeting the demand for short-term money, season-to-season loans, be a very unnecessary competitor to the co-operative credit societies?—It would, but the co-operative credit societies, the main activity of which at present is the granting of loans to persons who are in need of money, could turn their activities to other directions. Other co-operative institutions would take the place of the credit societies. After all, we want institutions which can lend money to those in need of money at convenient rates, without any attempt at usury, and if agricultural banks can take the place of the co-operative loan societies in some places, it would not be regrettable.

66,497. In answer to Question 7, you say that a good deal of fuss is unnecessarily made over the question of fragmentation of holdings? Do you distinguish between fragmentation and sub-division?—I do in my own way.

66,498. What is the difference, in your mind, between sub-division and fragmentaton?—Sub-division of holdings would take place if there is partition between the different proprietors of the holding. Fragmentation, according to me, is an economic idea and sub-division would probably convey a legal significance.

66,499. I think perhaps an even more useful connotation of the two terms would be this. Sub-division represents the inevitable dividing up of, let us say, a single plot when two heirs succeed. But when two heirs succeed to an inheritance consisting, for example, of two self-contained and separate units or plots, and when each heir insists upon getting the half of each plot then the result is fragmentation?—Yes.

66,500. Are you thinking of fragmentation in this sense or merely of sub-division?—I think that fragmentation is only an advancement of the principle of sub-division. It takes place at a later stage. Fragmentation is an economic idea and if you cannot check sub-division I find it difficult to check fragmentation. The only way in which fragmentation can be checked to some extent is by co-operative societies and by voluntary efforts. Any attempt to disturb the laws would mean not merely disturbing the habits of the people but all the existing institutions.

66,501. Where the several plots to which two or more heirs are succeeding are of different agricultural value, it is natural that each heir should have a share of the best as well as a share of the worst?—Yes.

66,502. I see, from your answer to Question 17 (*b*), that you think that any general rise in the standard of living, in other words, in the purchasing power and the desire to spend that purchasing power to good purpose, would be a condition favouring the growth of local industries and subsidiary industries?—Yes.

66,503. Are you thinking of subsidiary industries which, in the main, will produce commodities for local consumption?—Not merely that. If there is a rise in the standard of living, demands will increase and, hand in hand with that, there will be the necessity to earn more money. It would induce them to take to other occupations. I am thinking not merely of the direct effect of a rise in the standard of living but its indirect effect too.

66,504. Turning to your answer to Question 19 (*a*), you find that there is a great deal of unpopularity attaching to any attempt by Government to extend the restrictions upon grazing in Government forests?—I find that in my own district of Palamau and the reason which I assign to it is that preservation and reservation are carried on rather indiscriminately and by officers who have not taken care to ascertain the needs of the people and the customs in the locality. I am speaking from my experience of my own district. As a matter of fact, during my election campaign, one of the questions with which I have been approached by my electors in almost all parts of my district was the forest question and the grievances arising from preservation and reservation of forests. They do realise that preservation and reservation of forests are necessary, but what they object to is the manner in which they are carried out.

66,505. I suppose it is inevitable that the cultivators' outlook should be mainly concerned with the immediate future while, from the forestry angle, the Forest Officer has to think twenty years ahead?—That is quite true but I think the immediate necessities can also be served if the Forest Officers, in consultation with the local people, arrived at an arrangement whereby they would give a certain specified area to meet the local necessities of the people. In my district, forests are the only source of livelihood to the poorest of the poor. They gather leaves and wild fruit from the forests and sell them, and it is a matter of necessity for all those who own cattle because there is no other place where fodder is available.

66,506. I was interested to note that you think that it might be possible to organise co-operative hospitals. Is that a new idea of yours or have you had it from others?—I have often felt the need of hospitals when touring round the villages. Once I had an attack of cholera and with all my efforts, all my resources and all my influence, I could get no medical assistance and there I discussed with the men whom I met the idea of co-operative hospitals. They seemed to like it and since then I have thought of it on many occasions.

66,507. Is there any reason why, in one of the villages in which you have strong influence, you should not make the experiment? Have you consulted the Registrar at all?—There is no particular reason why I should not, but I have not as yet. I think that, if steps are taken by the Co-operative Department or the Department of Public Health to organise these hospitals and people are asked to co-operate the experiment will succeed.

66,508. I see from your answer to Question 25 (*a*) that you are very anxious that the idea of emigration should receive encouragement, as a means of relieving the pressure of the population on the soil?—Yes. I hold strong opinions on that. I feel that unless some other avenues are open to us there will be overcrowding on the land

and it will be very difficult for many people to support themselves on the land. The pressure on the land is much too great. Unless some colonies are reserved for Indians it is not possible to meet the demand.

66,509. Do you think that a measure of that sort would give lasting relief, or do you think the tendency is for the population to increase up to the maximum number which the soil is capable of supporting? In other words, do you think that the relief would be permanent or temporary?—The relief, to my mind, would not be merely temporary. It would operate for some time to come. Of course, no relief is permanent when there is a tendency for the population to increase indiscriminately. We have to find out other forms of relief as occasions arise.

66,510. Do you think there is any hope that the rise in the standard of living and general education would have the effect of limiting, in some degree, the rate of increase in the population?—Undoubtedly. Rise in the standard of living would check the growth of population, as would also education.

66,511. *Professor Gangulee*: Do you find that the standard of living has considerably increased among the rural population in this Province?—Among the rural population it has increased in the case of that class of men who have had contact with cities and towns.

66,512. Do you find any change in outlook among those people whose standard of living has improved?—Yes, there is a change of outlook, but often this change is not well regulated.

66,513. What do you mean by 'not well regulated'?—For instance, they have a desire to raise their standard of living. Instead of increasing their purchasing power and finding out other sources of income, they go and borrow money and live on that.

66,514. I understand you are the president of the Kisan Sabha. Could you tell us what is its organisation and what it stands for?—It is an organisation of tenants as distinguished from the organisation of zamindars and landlords. There is an association of landlords for the whole Province, and similarly there is an association for the *kisans*.

66,515. When was it formed?—It was formed before 1920 but I have been associated with it since 1921.

66,516. Is it your view that this organisation is primarily for the economic improvement of the ryots or has it got any political bias?—According to my idea, any political movement which is divorced from economics is a mere camouflage. The Kisan Sabha primarily exists for the economic development of the peasantry. It has sometimes to direct its attention to politics because other organisations, which I do not want to name, bring pressure upon the tenants by means of political institutions. For instance if the landlords, as a party, organise to capture all the seats in the legislature, then we, as members of the Kisan Sabha, have to do the same and that is the political part of it, if you like to call it political.

66,517. Would you please tell the Commission what exactly this Sabha has been doing towards the economic regeneration of the peasantry?—I might cite one instance for your information. In many places illegal cesses and *abwabs* were realised until lately and, on account of the activities of our Sabha, these methods were exposed to the tenantry in many places of North Bihar, so that it became no longer possible to realise from the tenantry illegal cesses and *abwabs* which were realised before.

66,518. In the introduction to this note that you have placed before the Commission it appears to me that you accuse the Government of

evolving formulae intended to placate and pacify the politically-minded section of the population? May I know what actually do you mean there?—I mean that Government recently have not given that attention to the economic development of the country which they gave before. They are busy in political fights and, as I have said, in evolving formulæ to placate and pacify political parties. I would explain my meaning by giving one or two illustrations. For instance, in 1875, when the Bengal Tenancy Act was on the legislative anvil, in spite of opposition from popular parties, it was the Government who gave the Bengal Tenancy Act to the Province of Bengal, Bihar and Orissa. But after that they have not made any attempt to ameliorate the conditions of the peasantry, and even when attempts have been made in Councils to introduce tenancy legislation and to bring it into conformity with present conditions, Government have always been sitting on the fence or have sided with forces that are working against the tenants.

66,519. From page 20 of your note I gather that you are in favour of candidates for such services as those occupied by *batwara* officers, *khas mahal* officers and so on being recruited from those who have had some sort of agricultural training?—Yes.

66,520. I think you were one of the signatories to the Report of the Bihar and Orissa Agricultural Committee of 1921?—Yes.

66,521. And as a result of the Report of that Committee the Sabour Agricultural College was abolished?—Yes.

66,522. Could you tell the Commission, please, why you were in favour of abolishing the Sabour Agricultural College?—The reasons for the abolition of the college are contained in a note which was submitted by Babu Ganesh Datta Singh who was then a member of the Legislative Council but is now the Minister in charge of Local Self-Government in this Province. This note was circulated before the Agricultural Committee met. If you will permit me, I shall read the first few lines of his note, which will give you an idea as to the reasons that impelled us to recommend the abolition of the Sabour institution. There is one further reason which I would like to add after I have finished the quotation:

"(1) The provincial research institutions are not at all necessary for the following reasons:—(*a*) There is a first class Imperial institution at Pusa in this Province, which is doing research work in all agricultural matters. The Province can very well utilise the result of its experiments without spending anything. Its location in the Province is a matter of special advantage. (*b*) There are research institutions in other Provinces, which are making important experiments in various matters and directions which are published from time to time in agricultural journals. This Province can very well profit by those experiments. (*c*) The provincial institutions have not done anything till now and they have not any special ground to urge in support of their existence."

The last of these three reasons was in fact the most important, and even some of us who were anxious to retain that institution, provided its utility to the Province was increased, were informed by the experts of that department that its utility could not be increased until the expenditure on this institution was multiplied, say, eight or ten times. That, of course, was beyond the financial resources of this Province.

66,523. The present position, I take it, is that the educational section of Sabour has been closed but the research or scientific section is still working?—Yes.

66,524. But when you made your recommendations you wanted to abolish both?—Yes.

66,525. Do you think the situation to-day is such that you are in a position to re-establish the institution?—I do not think that at present we can decide to re-establish the institution because that institution had made itself so thoroughly unpopular that unless some better work is shown by the Agricultural Department, and unless their activities in the direction of propaganda is better appreciated, any attempt to re-establish the institution would not succeed; that is why I recommended that instead of an agricultural institution of the type that was established at Sabour we should have agriculture taught in some of the colleges as one of the subjects of science and that a Faculty in Agriculture should be established in this University.

66,526. *Mr. Calvert*: On page 199 of your note you say that the indigenous methods have worked successfully for hundreds of years and their utility generally cannot be challenged. On page 197 you speak of the economic degeneration of the village. Do you not think that the economic degeneration has something to do with the traditional methods of agriculture?—The traditional methods of agriculture have been useful so far as they go, but they need to be supplemented by improved methods. What I mean to say is that there does not seem to be any very great fallacy in traditional methods. They have been of very great use in the past and they are working as successfully as it is possible for them to work, but we want a development of the traditional methods so that modern ideas may be utilised by the people who have been following such traditional methods.

66,527. *Dr. Hyder*: On page 197 of your note you ask us to induce the Government to extend its protection to the principal industry of India, which is agriculture, and which, as you say, is sorely in need of protection. May we know what kind of protection is it really that you want?—I have used the expression 'protection' in the latter part of the sentence really in a figurative sense, but I was referring there to the protection given to the other industries at the cost of the poor agriculturists. I feel that, on account of this protection which has been given to the other industries, agriculturists have had to suffer some loss and they have not been compensated by any benefits given in other ways by Government.

66,528. Somewhere, you seem to elaborate the plan of putting a small tax on exports. That surely would not be a benefit to the agriculturists, would it?—There are two things which I should like to say in answer to that: firstly, a tax which may not benefit the agriculturist who is interested in the export trade would certainly benefit the masses; and, secondly, in respect of those agricultural products in which we have almost a monopoly, a small export duty would not affect trade.

66,529. I presume it is known to you that there are a few things in which we have a monopoly and that it is all a question of prices, because if we add small bits here and there to the monopoly it adds to the cost of the people elsewhere?—These are things which would have to be worked out, but even admitting that the agriculturists who have something to do with export trade will be affected, I think that would do good to the country because it would lower the prices. The reduction in the price of certain agricultural products may injure some, but at the same time it is bound to benefit others. For instance,

wheat in the Punjab was selling at famine prices and an increase in the supply of wheat internally would reduce the price of that commodity, which would naturally be conducive to the best interest of the people as a whole.

66,530. But it would not be to the advantage of the agriculturist who is out to make a living and who wants to obtain more rupees for his produce?—As I say, if he is injured in one way, he will be benefited in another.

66,531. You say somewhere in your note that the present system of land tenure prevents holders of agricultural land from carrying out improvements. Is there anything in the Bengal Tenancy Act of 1875 which prevents a landlord, if he has registered his improvement in a court, from asking that court to enhance the rent?—What I meant was really the tenants of agricultural land. It is impossible for such tenants to carry out any improvements if the landlord is bent upon obstruction.

66,532. Do you think you could have match manufacture as a cottage industry?—I am afraid I cannot answer that question offhand.

66,533. *Babu A. P. Varma*: I have just one question about the Usurious Loans Act. You would bring down the interest to twelve per cent. Do you think that there will be people really to advance money on anything less than twelve per cent?—The exact figure would be determined by various considerations. I have given the figure as a basis for discussion, but I very strongly believe that, until the maximum limit of interest is imposed, the present Usurious Loans Act will be rendered entirely nugatory. This Act was passed in 1918 and, so far as I am aware, very little relief has been brought by it to anybody in the Province.

66,534. I suppose you know that the Registrar of Co-operative Societies, in his evidence before this Commission a short while ago, mentioned that the rate of interest that they take is Rs. 15-10-0. In this case as well, the figure is low?—As I said before, the rate of interest may be slightly higher than twelve per cent if it is so decided. But what I am most concerned about is that the maximum limit of interest which ought to be allowed should be fixed by Statute just as has been done in Europe and America.

66,535. You said that to stop fragmentation by law would involve changes in social customs and in law; I cannot speak much about law, but may I know what social customs would be interfered with?—By social customs I mean customs that are preliminary to taking any legal action, for instance, partition.

66,536. Partition could be plot by plot?—But if there is only one plot and two sons have an interest in that plot they may want to subdivide it. I know of a case in which two brothers owned, between them, a *katha* and a half and partition was sought for by both.

But these are really solitary instances. It is not the rule but rather the exception.

66,537. You say: "I know of several instances in which zamindars have neglected irrigation with a view to wreaking vengeance upon refractory tenants." When you make that statement, have you in your mind your own district or the whole of the Province?—I know of one case in my own district and one or two cases in the Gaya district.

66,538. Can you relate the instances?—When the settlement operations were going on in my district one zamindar (whom I do not like to

name) found that his tenants wanted commutation of the rents paid to him, and they succeeded in getting that by application to the Settlement Officer. Then for three consecutive years he cut open the *bunds* and did not allow any cultivation in the zamindari. That zamindar had a large store of grain, and therefore he did not suffer. He did that in the hope that ultimately he would be able to make up for the loss he had suffered at the settlement.

66,539. He did suffer loss?—He suffered immediate loss.

66,540. I hope there are not many such instances. Do you think the people are inclined at present to spend anything for fuel? Their tendency is to use cow-dung for fuel and not to buy fuel for cash. Do you think they will be prepared to spend anything on coal?—That will depend upon the extension of transport facilities. If coal is available at a cheap rate, they will buy coal.

66,541. Even then a price will have to be paid?—In some parts the cow-dung is not sufficient.

66,542. But there is the *shisham* tree. In Muzaffarpur they lop off its branches and use that as fuel?—That, so far as I am aware, is not allowed in reserved forests.

66,543. Would they be prepared to pay anything at all for their fuel?—I think in some parts of Chota Nagpur they would. As a matter of fact, they are paying in some parts at present.

66,644. *Professor Gangulee*: Would you tell the Commission whether the public men of the Province realise the need of compulsory free primary education in rural areas?—So far as I can gauge, they do.

66,545. You should be able to gauge, as you are a member of the Council?—I believe they do realise the need of primary education.

66,546. Where is the hitch then?—The difficulty is that some people do not like to pay for it. As a matter of fact, I have myself asked for sanction to introduce a bill to make primary education compulsory in rural areas, and I have proposed a cess of one anna in the rupee to raise funds for that purpose.

66,547. *The Chairman*: What sort of cess; raised on what?—A cess upon income. While I find that that part of my proposal which makes education compulsory is welcomed, the people are very suspicious of the other part which relates to taxation.

66,548. *Professor Gangulee*: You suggest one anna on income, or on land?—One anna on the amount on which the road cess is realised.

66,549. You follow the principle laid down in the proposed Act in Bengal?—Yes.

66,550. You think your public spirited men would oppose such a proposal?—I am not quite sure of that. There are some people who perhaps would not like to pay, or rather would not like to face their constituency with a taxation proposal.

(*The witness withdrew.*)

The Commission then adjourned till 10 a.m. on Wednesday, the 23rd November, 1927.

Wednesday, November 23rd, 1927.

PATNA.

PRESENT :

The MARQUESS OF LINLITHGOW, D.L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

Mr. E. DANBY.
Babu A. P. VARMA. } (*Co-opted Members*).

Mr. J. A. MADAN, I.C.S.
Mr. F. W. H. SMITH. } (*Joint Secretaries*).

Mr. W. B. HEYCOCK, I.C.S., Commissioner, Patna Division.

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—I had some experience of the system of agricultural education in force at the Sabour Agricultural College when I was Director of Agriculture in 1911. This college has since been closed. It is with reference to the agricultural education given at this college that my answers are framed. I am not conversant with any form of agricultural education at present given at any other institution in this Province. The Sabour College failed to attract a sufficient number of students for its full three years' course. Short courses were started, as an alternative measure, for actual cultivators but these courses did not prove very popular. The college was closed after the Reforms because, I suppose, it failed to attract students. It would, perhaps, have been better to ascertain why the college did not attract students and to overcome this difficulty than to close the college and abandon all hope of making it a success.

(v) Lads study agriculture mainly in the hope of finding employment. The difficulty in this Province is that there is little or no opening for trained agriculturists outside the Agricultural Department itself. This was the reason why the Sabour College did not attract students. After taking their diploma there was no career open to them except in the department itself and the department itself could then absorb only very few.

It might be asked why zamindars' sons did not come to the college and why zamindars do not employ trained agriculturists. The reason is to be found in the system of land tenure. The permanent settlement

is in force throughout the greater part of this Province. Zamindars are primarily rent collectors. They do not farm or cultivate their private lands themselves. Their custom is to give out their private lands on a share system or allow their servants to cultivate them Much could be done if zamindars could be induced to cultivate their own private lands by hired labour and to take an interest in farming. If they did this they would study agriculture themselves and would employ trained agriculturists. There is little prospect at present of the big zamindars taking a practical interest in farming.

(vi) The Sabour College has been closed. When it was open, as far as I remember, students did not come from the agricultural classes but from the professional classes, who at first expected the college to prove another avenue for employment.

For the short term course the pupils were drawn entirely from the agricultural classes. Actual cultivators were given a short course of training.

(ix) There was no career open for the students at Sabour College except in the department itself. This was the main reason why the college did not attract students.

(x) Middle class youths will not take up an agricultural career, even if Sabour College is re-opened, unless there are reasonable prospects of employment after they have taken their diploma.

There is no opening for them in *Khas Mahal* or Court of Wards estates, because in these estates the proprietor is really a rent collector and does not farm or cultivate his private lands by hired labour.

If zamindars, as I have said above, were to take an interest in farming and cultivate their own private lands themselves, there would automatically be an opening for trained agriculturists and the college at Sabour, if re-opened, would immediately be filled. I can imagine nothing more calculated to improve agriculture than for the landlord himself to cultivate on improved lines his own private lands. The tenantry would naturally follow his example.

As matters stand landlords are little likely to cultivate themselves but will continue, as at present, to collect their dues from the tenants and be satisfied with that. It is far more profitable to them and means less labour. In Champaran, with indigo and sugar, it always was the tenant who cultivated and the factory who purchased the crops. Direct cultivation by the landlord is more or less unknown in this Province. This is the main reason why agriculture does not offer openings to middle class youths.

(xii) In rural tracts the actual cultivators can be taught much by short courses on the agricultural farms provided that there is a farm manager competent and with time to spare to teach them. Practical training of this nature would be useful.

I am doubtful whether nature study or elementary instruction on school plots and school farms is of much use in rural tracts among children who from very early years have practical experience on their own fields helping their parents. I would prefer to teach the parents as suggested above. The children will then learn from their parents.

School plots and school farms would be useful in town areas where middle class children are probably more or less unacquainted with practical agriculture. But it is no use interesting this class of boy unless a college is opened and a career is possible to the student in agriculture.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) Local demonstrations have proved the best way of spreading improved varieties and manures. The important thing is to prove to the cultivator that an

improved variety, a new crop, etc., are a success, under conditions under which he can grow them himself. If this is done and he is once convinced, he will readily adopt the improvement. The idea is to open as many small demonstration farms as possible and to use these farms as the base from which to demonstrate the various improvements. It is necessary to bring improvements to the door of the cultivator and to keep in touch with the cultivator. This small demonstration farms do. Very great care should be taken not to push an improvement until it is fully demonstrated to be a success and to be a success under local conditions.

(*b*) One of the best ways to make effective field demonstration is to persuade a cultivator to allow it to be done on his own land under ordinary conditions. The criticism is often made that what can be done on a farm on expensive lines cannot be done on economical lines locally.

The cultivator wants to be convinced of two things, that the variety—say wheat—is a better variety and that it is a paying proposition to grow it, having regard both to the outturn and value of the crop and the cost of growing it.

This is the reason why a local demonstration under local conditions carries far more weight than a demonstration on a demonstration farm.

(*c*) My experience is that cultivators will always adopt expert advice, if they are once convinced of its value. The real difficulty is to convince them. They look at innovations with suspicion and think there is a catch somewhere. Generally they think that the increased cost of cultivation will eat up any profits that an increased yield will give. Once convinced, however, they are quite ready to accept expert advice.

(*d*) There have been some striking instances of success. For instance, (*a*) *Dahia* paddy. This particular paddy was isolated at Sabour and is cultivated now over a large area.

(*b*) *Sugarcane.*—Seedling canes bred at Coimbatore have proved a great success, *e.g.*, Co. 213 which is largely grown in North Bihar.

(*c*) *Groundnut.*—The introduction of this crop in Chota Nagpur has proved a great success.

Another variety of groundnut has proved very valuable on sandy lands, where other crops will not grow.

I do not know of any demonstration or propaganda work which has been pushed and failed.

QUESTION 4.—ADMINISTRATION.—(*c*) (i) The Agricultural and Veterinary Services.—The expansion of the Agricultural Department has, I think, been too slow. In some respects, too, the policy adopted by the department seems to me to be retrograde. I refer in particular to the closing of the Sabour College and to the failure to fill the posts of Botanist and Chemist.

In addition to the principal farms, where experimental work should be carried on, there should be a large increase in the number of demonstration farms. This means a large increase in staff. No real progress can be expected unless the staff is increased. This is one of the reasons why it was a pity to close the Sabour College. For some years the department itself could have absorbed all the promising students, if a real effort had been made to extend the activities of the department. The department should be interested not only in introducing improved varieties but with the assistance of the co-operative societies should interest itself in helping agriculturists to market their produce. Marketing the crops is most important and agriculturists can receive much help in this way.

Expansion of the Veterinary Department has also been too slow. But an attempt is being made to accelerate progress; a veterinary college is being built at Patna, a large cattle-breeding farm is also being established at Patna, and it is proposed to establish another one at Cuttack.

Work on the improvement of cattle-breeding is still in an experimental stage and progress must necessarily be very slow with the limited staff at present employed. Expansion of the department is necessary.

QUESTION 5.—FINANCE.—(*a*) The best way of financing agricultural operations is through the agency of co-operative societies. The Agricultural Department should work in close touch with the Registrar of Co-operative Societies. The village societies should not only be able to finance agriculturists but should be able to help them to market their produce. One thing is essential for success. There must be adequate supervision and control of the co-operative societies. There have been signs of deterioration in recent years among co-operative societies. Lack of supervision has in cases led to embezzlement by the staff. I emphasise this point, because if the societies themselves are not financially sound or if there are not sufficient safeguards against embezzlement, the whole movement will be discredited and agriculturists will fight shy of these societies. With adequate supervision and the growth of healthy societies there is every prospect of financing agricultural ventures adequately.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) Agriculturists get into debt mainly through borrowing to meet marriage and funeral expenses and other expenses connected with social ceremonies. The joint family system is also largely responsible for indebtedness. A family may be for generations in debt.

(ii) The *mahajan* is the main source of credit. Where co-operative societies have been established and are successful, the *mahajan* is eliminated and the society takes his place. But there are many cases where members of a co-operative society still go to the *mahajan*, particularly in urban areas.

(iii) Once a loan has been taken it is very difficult to clear it off. The rate of interest is high. The creditor prefers to keep the loan alive and add the interest which falls due to the loan. By means of the loan the creditor controls the debtor and creates a lien on the crop. The crop in fact is more or less earmarked as security for the loan. It often comes to this, that the debtor cultivates his land more or less for the *mahajan* who keeps him going as long as he is faithful and does not try and go elsewhere for a loan and so disturb the creditor's security. The amount of loan taken is generally such that the debtor can never hope to repay it together with the high interest charges which accrue.

(*b*) The most effectual and the only practical way of dealing with agricultural indebtedness is by means of the co-operative movement. Societies, if properly conducted, can eliminate the *mahajan*. An isolated debtor has no chance with a *mahajan* who will often refuse to take back the loan. A society can deal with the *mahajan* and rescue all but the hopeless cases from the *mahajan*.

A Usuricus Loans Act would be very useful to societies when the question comes up of repaying *mahajans* for loans contracted by members joining a society, because it would be possible to eliminate the excessive interest charges.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) Excessive subdivision of holdings does mean loss of agricultural efficiency. I am unable to suggest any means of preventing it, with the law as it stands at present.

In this division, excessive subdivision of tenancy rights is not the only evil; there is also an excessive subdivision of proprietary interests—particularly in Patna district. Many proprietors are little more than tenants now.

QUESTION 8.—IRRIGATION.—(*a*) There are good private irrigation systems, particularly in Gaya district, in this division. These systems extend over a great part of the district and are very valuable.

These systems are in many cases neglected and are not properly kept up by the landlords concerned, partly because the landlords of several villages are responsible for the systems and partly because these systems are not in reality a source of revenue directly dependent for its revenue on its efficiency. This is due to the following reason:—

A very large area in this district does not pay a cash rent but a produce rent. The produce rent is in almost all cases half the gross produce. The theory is that these rents must not be commuted to cash rents because, if they are commuted, the landlord will have no inducement to keep up the irrigation system. Ordinarily speaking, under the Tenancy Act a tenant is entitled to have his rent commuted, if he applies. But in cases where there is an irrigation system which the landlord may neglect, if commutation is allowed, his application is refused. Generally speaking, every tenant wants commutation. Every landlord opposes it. This opinion is based on a considerable experience derived from hearing applications for commutation.

The result is, all that the landlord need do is to keep his system in a sufficient state of repair to prevent an application for commutation being successful. He has no inducement to improve the system. The return he gets for keeping up the system is the privilege of taking half the gross produce as his rent. He is under no liability to supply water to individual tenants. Provided that the system is in repair and provided that each village gets its due number of days for irrigation, he has no further responsibility. I should add that the liability to pay produce rent does not depend in law on the maintenance of the irrigation system. Whether the system is maintained or not, the full rent must be paid. It is the revenue authorities who decline to commute rent where there is a reasonably efficient system, but this refusal to commute does not entail any responsibility on the landlord to keep up the system. The only check is that the revenue authorities may, on a second application, commute if gross neglect is proved.

Apart from other incidental disadvantages of the system of payment of rent in kind (and there are many), these irrigation systems would, I think, be better looked after if the irrigation dues were separate from the rent as is the case with Government canals. Secondly, I think half the gross produce is too high a rental—even allowing that irrigation charges are included in it. Thirdly, from an agricultural point of view I think the system deprives the tenant of any incentive to improve and develop his produce-paying lands. It is a fact that he devotes his best efforts to his cash-paying lands—if he has any—and is apt to neglect his produce-rent paying lands.

In Patna district there are many systems which have fallen into disrepair for similar reasons.

The danger of any change is this: It is very doubtful whether landlords would ever keep up an irrigation scheme if it has to be kept up on the lines on which Government canals are kept up—that is to say, if the water was sold and only the person who got the water paid.

The systems I have mentioned cost the landlord very little to maintain and the return in the shape of produce rent is certain and comes from all produce-rent payers whether in fact they get water or not.

QUESTION 11.—CROPS.—(*a*) (i) The only practical method, which suggests itself, of improving existing crops is to utilise the experimental farms to ascertain the best varieties suitable to any particular locality and then to popularise that variety by actual demonstration on the spot. This method has proved effectual in several instances, *e.g.*, pure wheat, *Dahia* paddy, *dhaincha* manuring in Orissa, sugarcane, etc.

(ii) The same methods should be adopted in introducing new crops, including fodder crops. First experiment, then actual demonstration on the spot.

(iii) The simplest way is to grow and distribute pure seed through the co-operative societies and utilise these societies as a means for growing and distributing pure selected seed on a wider scale.

(iv) The only effectual way to prevent danger by wild animals is to clear the jungle. As long as lands are cultivated on the borders of jungle areas damage by wild animals is inevitable.

QUESTION 14.—IMPLEMENTS.—(*b*) Two things stand in the way of the general adoption of improved implements by cultivators, firstly, the cost; secondly the unsuitability of the plough cattle to draw, for instance, a heavier and deeper working plough.

The first difficulty might be overcome with the help of the co-operative societies; the second depends to a great extent on the improvement of the cattle.

QUESTION 15.—VETERINARY.—(*a*) I should prefer a Development Officer to be in control not only of the Veterinary Department but of the Agricultural and Co-operative departments. The activities of all these departments touch at certain points and to ensure harmonious and efficient working an officer supervising and controlling all three departments is necessary. Such an officer should have a wide outlook and should be prepared to take up far-reaching schemes necessitating the co-operation of all these departments.

(*b*) (i) Dispensaries are under district boards and municipalities and are working fairly well.

(ii) The expansion is not sufficiently rapid, but this is largely due to want of funds. Some local bodies have very little money to spare for this branch of work.

(iii) It might make for efficiency if control were transferred to the provincial authority, provided adequate resources were placed under the control of the Veterinary Department. The local bodies would, however, probably object to contributing unless control was in their hands. I think it is an advantage to associate local bodies with the control of dispensaries; they can do much to remove misunderstandings and prejudice, *e.g.*, in the case of inoculation.

(*d*) Ignorance and prejudice are the chief obstacles. I do not think the time is ripe for legislation. The prejudice against inoculation is being gradually overcome. All that is necessary is to convince agriculturists of the benefits of inoculation and their prejudices will be overcome. This is a matter of time and patience and considerable success has already been obtained.

Segregation and disposal of diseased carcasses cost money. This alone would prevent the voluntary adoption of any measures of this kind. As regards prohibition of the movement of animals exposed to infection, it would be impossible to enforce any such measure with the existing staff, and the proposal to apply such a measure would arouse general opposition. The people are not sufficiently advanced to appreciate the value of such measures.

Mr. W. B. Heycock.

QUESTION 16.—ANIMAL HUSBANDRY.—(*c*) The hot weather is the time when fodder shortage is most acute.

As soon as the rains break and grazing becomes available the cattle improve very rapidly.

(*d*) The only way to supplement the fodder supply in this division is for agriculturists to grow fodder crops. Common grazing grounds are no real help. Cultivation is intense in this division and, generally speaking, there is very little waste land. There are of course the Kaimur hills in the south of Shahabad and the jungle areas in the south of Gaya. My impression is that the closer the cultivation the more it is realised that fodder crops and stall feeding are a necessity. Closely bound up with this question is the elimination of weedy cattle which it is waste of money to feed. The solution is two-fold:

(1) Improvement of cattle and fewer cattle.

(2) The growing of fodder crops to supplement grazing, particularly in the hot months of the year. The provision of adequate communal grazing grounds is not possible, and even if it were possible, it would have this disadvantage: it encourages the breeding of weedy cattle and does not enforce the lesson that the cultivator must pay for the feeding of his own cattle. He should not expect the community to relieve him of this burden.

(*e*) In this Province, owing to the permanent settlement, landowners are not likely to take a practical interest in this matter. Their attention is concentrated on getting in the rents. As a whole, they do not regard themselves as having any duty to perform towards their tenants.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) This problem does not arise in this division.

There is no shortage of labour. In fact the districts in this division are too densely populated.

QUESTION 20.—MARKETING.—(*a*) Considerable improvement is needed to enable the actual grower of crops to get his crops to the best market and realise the proper price for his crops. Co-operative societies can be of great assistance in this matter. For instance, at Bihar potatoes are grown by many of the cultivators. One way the co-operative societies can help, when the time for marketing arrives, is to take the potatoes grown by all its members, arrange a proper price in Calcutta or elsewhere, and see to the despatch of the consignments; in fact dispose of the produce for the members in the interest of the members. No single member of the society can do this for himself.

I should like to see more use made of co-operative societies for the marketing of produce grown by their members. Successful marketing benefits the members and popularises the co-operative movement, to which agriculture must look in the long run for its capital and the marketing of its produce.

QUESTION 22.—CO-OPERATION.—(*a*) There is a danger in opening too many societies, unless adequate provision is made for their inspection and control and unless suitable members can be found to form the panchayats. The most essential safeguard is regular audit and inspection; without this safeguard embezzlements occur, the dues are not properly collected and the money at the disposal of the society is not fairly given out.

The members themselves are seldom able to control their own panchayats and the panchayats are inclined to look to their own personal advantage rather than run the societies for the benefit of the members.

The danger lies in over-expansion without an adequate inspecting agency. There is no difficulty in opening societies; the difficulty lies in seeing that the societies which are opened are properly managed.

Subject to these remarks, I regard the co-operative movement as the movement which must eventually finance agriculturists and help in marketing their produce. There is no limit to the good which can be done by such societies, provided that the members are capable of managing the societies, and it is in this last respect that the difficulty lies. The communal sense is not very widely developed and the agriculturists are very ignorant. Unless, therefore, Government can for a time exercise a paternal control over the societies the movement is in great danger of being discredited.

My answer to this question is that Government should do more to encourage the growth of the co-operative movement and, in particular, should make the power of supervision and control closer. At the present stage of development, societies cannot succeed without close control and supervision by Government.

(*b*) (iii) An extension of societies for the sale of produce is urgently needed. The agriculturist does not get the proper value for his produce. He is not sufficiently educated to be able to protect himself and wants, in particular, to be looked after when he comes to market his crops.

Ignorance and indebtedness are the chief factors which stand in the way of an improvement of his position.

QUESTION 23.—GENERAL EDUCATION.—(*a*) (iii) Elementary education is not sufficiently widespread and is very poor in quality.

The main difficulties are these:—

(1) Dearth of teachers.

(2) Such teachers as there are are not very competent.

(3) Want of funds. Owing to want of funds elementary education is not sufficiently widespread.

(4) Elementary schools are not adequately supervised.

(5) The course is not long enough.

The result is that the number of boys who are supposed to receive a good elementary education is not nearly as large as the statistics indicate. Many who go through the lower primary course have forgotten all they were ever taught in a year or two.

The teachers are often really not competent to teach and I doubt very much whether all the primary schools shown on paper exist in more than name. Such schools are not likely to be properly conducted with the present class of teachers, unless inspection is adequate and frequent or unless there are good and trustworthy committees of management. Such committees are difficult to find.

Mr. W. B. Heycock.

APPENDIX.

REPLIES TO THE QUESTIONNAIRE SUBMITTED BY MR. B. FOLEY, I.C.S., BOARD OF REVENUE, BIHAR AND ORISSA.

QUESTION 2.—AGRICULTURAL EDUCATION.—As Collector I was supposed to be chairman of the agricultural societies of several districts. An Indian Inspector of Agriculture was generally sent round to the district to assist. My impression was that these inspectors were useless: they had a little book knowledge and nothing else. I used to send them to various planters to see if they could be of assistance, but found the planters generally looked on them as a laughing stock. Apparently Indians used to join the Sabour College with the object merely of obtaining employment under Government. On leaving the college they did not as a rule undertake farming on their own account. Sabour College has now been closed and I have been out of touch with the Agricultural Department for several years.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*b*) From my experience as Commissioner of Chota Nagpur I should say that the Chota Nagpur Tenancy Act in its sections prohibiting the sale, transfer or mortgage of holdings by tenants has largely been a failure. The ryots have not thereby been induced to abstain from parting with their holdings but they receive less for their holdings than they would otherwise, if transfers were unrestricted. There are various methods of getting round the law. The commonest is that the ryot should surrender his holding to his landlord, who sells it to the person who wishes to purchase, the lanlord taking a large percentage of the purchase money.

Similarly in Sambalpur the Central Provinces Land Revenue Act has been largely a failure. Here if a man sells or mortgages his land illegally, the next-of-kin can claim it. As a matter of fact the *gaontia*, who corresponds in most respects to the landlord, generally claims under the Section. What has really happened is that the ryot has sold to a money-lender through the *gaontia*.

The system in the Santal Parganas, I think, is rather more successful. Here the *pradhani* system is in force, and the *pradhan* is only a headman who collects rents.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—It is difficult to see how sub-division of holdings can be prevented, but something might be done if the excessive sub-division of estates were prevented by a revision of the Partition Act in the Province. I believe the excessive sub-division of estates encourages the excessive sub-division of holdings.

QUESTION 8.—IRRIGATION.—The obstacle to any improvement in the way of irrigation in Bihar is the existence of the permanent settlement. It is difficult to see how any improvement can be effected in the present conditions.

There are many districts where new irrigation schemes are required and where they could easily be effected by Government to the immense benefit of the people, if only some small return could be secured to Government on the capital expended. As it is, the land revenue from the Patna, Tirhut and Bhagalpur divisions is small as compared with other Provinces, and permanently fixed. In Chota Nagpur the land revenue is insignificant.

During my service I remember having irrigation schemes proposed in the districts mentioned below:

(1) When I was Collector of Gaya in 1906-08, the District Engineer had drawn up a scheme for the improvement of irrigation in part of the district. It was found financially impossible because Government would receive no return for the expenditure.

(2) When I was Collector of Saran I received a scheme for improving the drainage of part of the east of the district. It would have been beneficial but was quite impracticable, as the people would advance no money. They wished Government to complete the scheme, and then put on a cess to recover the costs. The people of Saran are experts in avoiding payments of Government demands, and they were aware that they could easily evade the payment of most of the cess. Therefore the cost would have fallen almost entirely on Government who would have received no return for the capital expended.

(3) Lately I have received a scheme for the drainage of a big *chaur* or marsh called the Hardia *Chaur* in Saran near Sonepore. Government enquired whether the people would provide the necessary cost. The estimate was about one lakh of rupees. Some of the residents promise to repay the cost by instalments, if the work were first completed, having, I believe, not the slightest intention of contributing anything, and knowing that Government would be unable to recover anything but a fraction of the cost from them.

(4) When Commissioner of Chota Nagpur it was necessary for me to examine several irrigation schemes in the district of Palamau, mostly inaugurated by a previous Deputy Commissioner. These schemes had mostly failed. Government received no extra revenue in consequence of them and it was found impossible to induce the various zamindars who had been prevailed on to subscribe to the schemes originally to maintain their interest and endeavour to make the schemes a success.

(5) When Commissioner of Bhagalpur I found irrigation had greatly been neglected in the south part of the Bhagalpur district. In consequence scarcity was regularly occurring every few years. This could easily be prevented by a series of irrigation works. Government could not put up the capital for these as there would be no return. Two schemes were started when I was there, under the Minor Works Irrigation Act, but progress has been very slow and these two schemes only touch a portion of the area. Action ought to be taken in many instances under the Private Works Irrigation Act but there are inherent defects in this Act which, to a very great extent, mar its utility.

Conditions are to a great extent the same in South Monghyr. Here, as in South Bhagalpur, irrigation has deteriorated in consequence of reckless commutation of produce rents, in consequence of which the zamindars have ceased to take interest in their works of irrigation.

If only Government could secure some return for its capital by increased land revenue, it would not be difficult to make

the whole of South Bhagalpur and South Monghyr practically immune against famine and scarcity.

(6) As member of the Board of Revenue, I was requested lately to report on an irrigation project called the Khora Valley irrigation, in the neighbourhood of Bhabua, Shahabad, prepared by the Public Works Department with a view to securing this tract of country against famine. The expenditure was estimated at twenty-and-a-half lakhs, the return to Government for nineteen years would be practically *nil* and the return after that less than one-quarter per cent from water rates. The zamindars and ryots would probably be immensely benefited by the scheme, but in consequence of the permanent settlement probably the whole cost would fall on Government.

QUESTION 16.—ANIMAL HUSBANDRY.—I have noticed that the cattle in the district of Saran, where there is practically no grazing and where the cattle are nearly all stall-fed, are considerably superior to cattle elsewhere in the Province. I expected to find the cattle superior in Purnea, where there are large tracts of grazing land. I found them very inferior, because these grazing tracts are utilised for enormous herds of miserable stunted cattle, most of which are worthless. I found the same to be the case in Bhagalpur to a lesser extent. The absence of pasture is not, I think, the chief cause of the inferiority of the cattle. The Hindu religion does not permit the destruction of cattle. The ordinary cultivator usually takes no interest in obtaining better cattle. In the Bettiah Wards estate buffalo bulls are appreciated by the people for breeding but the people did not care to utilize the other breeding bulls which the estate offered them.

QUESTION 19.—FORESTS.—1. The destruction of forests is going on all over the Province, except where forests are reserved or protected. I endeavoured to do what I could when Commissioner of Chota Nagpur for four years, and all the estates under the Court of Wards do what they can to preserve forests, but I look on the general question with despair. I am convinced that no zamindars or ryots in the Province will ever take any measures to preserve forests, unless compelled. They look on all measures taken by Government with suspicion. Both zamindars and ryots look upon the destruction of forests as a matter of absolute indifference. No zamindar will take any measures to make forests a source of wealth for the future: if he sees any opportunity of making money by allowing the destruction of his forests, he will always avail himself of the opportunity. A ryot never has any idea of the value of timber and will always cut down trees ruthlessly for the slightest need, regardless of the future: he resents any interference either on the part of Government or the zamindar: unless prevented he will cut down forests wholesale and sell the wood.

2. When I was Commissioner of Chota Nagpur an endeavour was made to conclude agreements binding the Wards and Encumbered Estates to reserve forests for some twenty years. The legality of these agreements has been disputed and the Local Government no longer seeks to bind zamindars in this way. As soon as an estate is released from management therefore, the zamindar as a rule repudiates all these agreements and seeks to make all the money he can from the destruction of his forests. At present there is only hope of forests in Bettiah and Ramgarh, as these estates will be for a long time under Court of Wards.

3. The Local Government in 1926 endeavoured to start a policy of acquiring so much private forest every year in the interest of the

Province. The expenditure was vetoed by the Council, who are altogether opposed to forest conservation.

4. The policy pursued by the settlement has been unfortunate in this respect, and the destruction of forests in Ranchi and Hazariabagh, which might have been arrested, has been accelerated by that policy. Manbhum, which used to be covered with forest, is an awful warning in this respect. The Santal Parganas are not far behind. Large tracts have been cleared of trees altogether.

5. There is far too much grazing allowed in all forests which are not reserved by Government and the young shoots are generally eaten by goats and cattle.

There is a pernicious custom in Chota Nagpur, the Santal Parganas, Gaya and elsewhere of burning the hill sides at the beginning of the hot weather in order to provide grass for the grazing of cattle. These cattle are nearly all diminutive, stunted and nearly worthless animals; most of them would be better destroyed.

6. In consequence, the deterioration of forests has led to considerable soil erosion. The Bengal Government, in consequence of floods of the Damudar in its lower course, represented the matter to the Bihar Government and asked that measures should be taken to prevent the destruction of forests and the erosion of soil in the Damudar Valley in Hazaribagh. Measures are being taken but the expense involved is very large, and I think it is doubtful if they can be taken on a sufficiently large scale. Soil erosion is common in many other districts. The people decline to acknowledge that any harm is being done.

7. I think it is to be acknowledged that, with the growth of population and industries, the whole of the forests in Bihar and Orissa with the exception of those managed by the Forest Department will disappear. There is everything to cause such destruction and nothing to prevent it.

Oral Evidence.

66,551. *The Chairman*: Mr. Heycock, you are Commissioner of the Patna Division?—Yes.

66,552. Are we to judge from your answer to Question 2 that you remain in some doubt as to the wisdom of the decision to close the Sabour College?—Yes.

66,553. Do you think the sort of difficulties which faced the college before it was closed are difficulties which, in the nature of things, are likely to present themselves in course of the earlier stages of such institutions?—Yes; I think, given time and the expansion of the department, there would have been a good deal of opportunity, with more experience, for training students there. In fact, I do not think the college was open for very many years; I do not think it was opened much before about 1911 or 1912, (I cannot remember the exact date) and it was closed after about seven years' trial.

66,554. In the earlier stages of agricultural progress and agricultural education it is perhaps not unnatural that most young men who go to a college go to fit themselves for the public service?—Yes, that seemed to be the original impression when it was created, that it was another career opening out for students, and there was a certain amount of disappointment when they found their hopes were not realised.

66,555. It is perhaps reasonable to expect two stages of difficulty: the first before your service grows at all, when the places available for trained men are few and far between, and thereafter the period of difficulty that must exist until the age incidence is distributed, as it were, throughout the service?—Yes, I think there was a good deal of the first difficulty, and I think there was another handicap; the War came on and some of the officers belonging to the department went off to the War. For instance, Mr. Woodhouse, who was Economic Botanist, went off to the War and was unfortunately killed. So that that took away one of the available members of the staff during the period when the college was on trial.

66,556. Were any trainees of the college taken into the Revenue Department?—No; when the college first opened there was a rule in the Revenue circulars that they were not to look for employment in Government *khas mahals* and estates; attention was drawn to that rule; that was subsequently modified, but it had some discouraging effect at the time.

66,557. Is it your view that it might be to the public advantage that a proportion, at any rate, of officers in the Revenue Department should have a certain amount of equipment in technical agriculture?—Yes. I think it would certainly be advisable if that could be arranged.

66,558. Would you like to see the matter of the Sabour College reviewed?—Yes, personally I think it might be given another chance if it were possible.

66,559. On page 218, in answer to Question 2 (x), you emphasise the value which would accrue to agriculture if zamindars and their sons would take a personal interest in the business of farming?—Yes.

66,560. Can you suggest any means by which that interest might be encouraged?—It is very difficult to say but, as a matter of fact, most of the big zamindars have large areas under private cultivation, and if they could be induced to take an interest and employ trained agriculturists, good results might be obtained. I think they did try at one time, at Sabour, to interest the sons of big zamindars to come and take a short course.

66,561. What term is used to describe the home farm in this Province? Is there a special term?—I do not think so.

66,562. Is the expression *sir* used?—They call it *sir* or *bakasht* lands, but they generally call it *zirat*.

66,563. From time to time it has been suggested in evidence before the Commission that it might be well if honours were given to individuals who show themselves active in promoting agricultural progress; what do you say to that?—I think any step of that nature would prove an encouragement if there was really public recognition of a zamindar who really tried to promote agriculture; but so far I do not think there have been many cases of zamindars taking that interest, or of much recognition of the fact.

66,564. On page 219, you speak of the policy of the department in closing the college, which policy you stigmatise as retrograde. Is 'department' the appropriate expression; or was it Government?—What I mean by the department is Government in the Agricultural Department; I presume it was their decision. I do not know what was the opinion of the members of the Agricultural Department; that I have no information about.

66,565. In answer to Question 5 (*a*), you say: "There have been signs of deterioration in recent years among co-operative societies.

Lack of supervision has in cases led to embezzlement by the staff." Do you mean lack of supervision by a trained personnel in the Co-operative Department?—Yes. What we keep getting, at times, is liquidation in some of these societies, and when we come to liquidate we find it extremely difficult to collect the outstanding dues. Some of the societies have had to go into liquidation under the orders of the Registrar, and when we come to realise the dues we find considerable difficulty. Sometimes, when we trace out these dues, we find that the money has gone into quarters where it should not have gone and that it has not been spent wisely. In fact, I think, in the interests of the Co-operative Department, effective audit is most essential at the present stage, because the actual panchayats of committees which control the giving out of the money do not always give it out to the best advantage. I am only speaking generally, based on a few instances, because I am not closely connected with that department.

66,566. Have you taken a personal interest in the Co-operative Department?—When I was Director of Agriculture I used to take an interest, but now, as Commissioner, the work of that department comes very little directly before me. Occasionally during inspection of offices I come across these liquidation cases to which I am referring, but that is because it is put on to the revenue staff to collect the outstandings by certificate; in that way we come into some touch with them; but the District Magistrates, of course, have more touch, because they are sometimes chairmen of some of the Central Banks in the towns.

66,567. Where societies are admittedly unhealthy and unsound, is it your own view that liquidation and winding up is the appropriate course, or do you think reconstruction is the wiser course?—I think the Registrar would always reconstruct or give them a new lease of life if it were possible; it is only when matters have gone too far and the only alternative is liquidation that he takes that step.

66,568. In answer to Question 6 (*b*), you say: "A Usurious Loans Act would be very useful to societies when the question comes up of repaying *mahajans* for loans contracted by members joining a society". Are you familiar with the existing state of the law in the matter of the Usurious Loans Act?—No, I have not much acquaintance with it, but what I thought was that an Act of that nature would provide for lowering the rate of interest when it has been found to be excessive, when the society clears off the *mahajan's* debts before admitting persons as members of the society; that is to say, they would put them straight with the *mahajan* and then admit them to their societies, and in that case, if they could legally put down the excessive rates of interest, it might be of considerable assistance.

66,569. *Sir Henry Lawrence*: Have you seen the draft of an Act of that character?—No, I have not; I mean I do not know that we have an Act of that character working here; but I understood that it would contain provisions of that nature.

Could you draft such an Act?

The Chairman: There is one in force in the Province.

66,570. *Sir Henry Lawrence*: But not of the character to which the witness refers, under which the society could reduce the rate of interest?—That is the way I contemplated it as being most useful, because when a new society is formed and the members come in, it is generally desirable to clear off their debts with the *mahajan* first and start them afresh.

66,571. *The Chairman*: But I take it that you are concerned to place the society in a position in which it could prevail upon the debtor to move, under some appropriate Act?—Yes.

66,572. You do not wish to place the society, as such, in a position to go to law on behalf of the debtor?—No; what I was contemplating was that the debtors themselves might be asked to do it as a condition of coming into the society.

66,573. But you are not familiar with the existing state of the law in the Province in that matter?—No.

66,574. On page 221 you suggest that the system of produce rent tends to reduce agricultural efficiency in that it acts as a deterrent to the cultivator in any attempt to improve his outturn?—Yes.

66,575. What is the custom in this Province where produce rent is taken on a fifty—fifty basis? Would you develop a little the distinction between produce-paying lands and cash-paying lands?—The essence of the produce-paying lands is that the tenant pays rent in kind instead of a cash rent. The most common form, at any rate in this division, is what they call *danabandi* under which, when the crop is ripe, the landlords or their servants go round and estimate the outturn. Then they more or less convert that into cash at the prevailing prices and the tenant has to pay that as rent. The difficulty about it is that disputes occur continually at the time of appraisement.

66,576. Produce-paying lands means lands the rent of which is paid on the basis of produce?—Yes.

66,577. And cash-paying lands those on which a cash rent is paid?—They pay a fixed cash rent, but in the case of produce-paying lands they pay according to the outturn of the field in any particular year.

66,578. Yes, I read it wrongly; I thought you were making reference to the practice under which there is a difference in proportion as between landlord and tenant in the case of two different crops?—There is this difference, that the cash rent is fixed permanently and the tenant pays that every year, whatever the outturn is; the rent is on a fixed basis and is generally considered to be lower than the produce rent. Where it is produce rent, the tenant is legally bound to pay half the gross produce.

66,579. Do you not have an arrangement by which rice lands pay more than lands growing other crops?—No; the great majority of the produce-paying lands are rice lands because of this system of irrigation to which I was referring, on which they depend to a certain extent.

66,580. *Professor Gangulee*: For how many years is this cash rent fixed?—The cash rent is fixed until it is raised by the decree of the civil court. A man can go to the civil court and sue for enhancement of rent on certain specified grounds; but in practice it is very rare that any such suits are brought, and when they are brought they are generally brought on the ground of a rise in prevailing prices.

66,581. *Dr. Hyder*: Have you not another system under which the cash rent is fixed for ever?—Yes, there is that; but the majority of lands are not held on a cash rent which is fixed for ever. Of course, the cash rent is fixed subject to its being raised by a decree of the civil court.

66,582. Is that decree given by reason of improvement of the land?—The most usual reason is for rise of prices; that is the easiest. It is very difficult, under the ordinary Tenancy Act, to get the rate of rent raised.

66,583. *The Chairman*: In answer to Question 15 (*a*), I gather you are suggesting a Development Commissioner?—Yes, I thought that these three departments, which are gradually expanding and will probably expand much in the future, touch at so many points that probably there will be more harmonious working with one single control.

66,584. Do you suggest that the Development Commissioner should be a Secretary to Government?—No, that was not in the essence of my idea.

66,585. Do you not think there is some danger, where a special officer is detailed to effect co-ordination between several departments, that these two things may happen: firstly, there may be an apparent lowering in the status of the heads of those departments, and, secondly, the heads of those departments may feel that as co-ordination between departments is in the hands of a special officer, it is none of their business to attempt to achieve it?—I think there is some danger in that sense, but what I was contemplating was that in agricultural and veterinary matters, at any rate, there would be people with specially knowledge of those problems, that the Development Commissioner would have more general knowledge, and where they could touch would compel them to co-ordinate. For instance, take the co-operative side; it might be very difficult to get the Registrar of Co-operative Societies to be very interested in a particular veterinary scheme which the Development Commissioner might think ought to be pushed.

66,586. At what stage do you suggest that schemes which concern the Development Commissioner should come before him?—I would suggest that he should be acquainted with the working of all three departments and might initiate schemes as well as take up schemes that they put before him.

66,587. Do you not think there is some danger that a scheme may be, in some degree, established and hardened before the Commissioner is informed of it? Do you not think that true co-ordination is more likely to be effected by a sympathetic understanding between heads of departments who begin getting into touch with each other and learning each others' minds about a scheme in common, at the very outset of the scheme?—Of course, if the heads of the departments can co-operate in that sense, then that would do away with any necessity for any such appointment; but there is some difficulty about that at times.

66,588. In answer to Question 15 (*d*), you are speaking of the immunisation of cattle from rinderpest by methods of inoculation. Are you thinking there of the method which is at present being used in this Province, the serum-alone method, or are you thinking of the more lasting immunity conferred by the serum-simultaneous method?—I was thinking more of the methods at present employed in the Province; they met with very great opposition at first, but that is gradually disappearing.

66,589. Would you agree that it is difficult to conceive of any scheme to meet the danger of rinderpest being fully effective unless the Feudatory States were also prepared to take part?—Yes. Of course, they adjoin the Province more in Orissa than up this side. Our real trouble on this side would be the Nepal Terai.

66,590. Is it your view that the authorities in the Feudatory States would be ready to co-operate with the Province?—I have not had much experience in Orissa, but I imagine that if the matters were put properly before them they would probably join in any steps that were being taken.

66,591. In answer to Question 22 (*b*), you are speaking of the expansion of societies for the sale of produce, and I gather that you would favour the setting up of such if you thought they were likely to be a success. Are there any cases of successful sale societies working in the Province?—I came across one in Bihar which I mentioned in my note; that was mainly in connection with the sale of potatoes; I think there is room for societies of that nature.

66,592. On page 223 you cite the case of the potato society, but you know of no others?—I have not really been closely associated with this branch of work.

66,593. I thought perhaps you had some in mind, and could tell us about it from the outside point of view?—This was the only particular one that I came across recently and that has proved a great success.

66,594. You deal in your answer to Question 23 (*a*) with the matter of compulsory education, amongst other things. I think there is a permissive Compulsory Education Act in operation in the Province. It is within the capacity of local authorities to adopt compulsory education, is it not?—Under certain conditions. I do not personally recommend that.

66,595. But is it the case that there is a permissive Act in force?—There is a permissive Act in force, but I think the question of money is the real difficulty; there is the difficulty of teachers and various other difficulties.

66,596. Are you familiar with conditions in the Bankipur Union?—No, I have never worked in Cuttack.

66,597. I am told that there they have adopted compulsory education in a small area in which there are only 4,723 males; 629 boys were enrolled but the attendance only amounted to 67 per cent. You told us a moment ago that you yourself do not recommend the adoption of the compulsory system; would you develop that?—I do not object to compulsory education as such, but my opinion at the present moment is that there are not enough funds to carry it out, nor are there enough teachers or staff to enforce it if you brought it in. One of the main difficulties about elementary education is competent teachers.

66,598. Apart from the difficulty of financing compulsory education and of providing the necessary staff, do you think public opinion is ripe for a step of that sort in this Province?—I think public opinion would favour it, but I am not at all sure that there would not be a little difficulty, to start with, over the compulsory nature of getting the boys to school, when they came to be fined and so on when they did not go; there might be a little trouble over that when it was actually working, but I think public opinion would advocate the step.

66,599. *Professor Gangulee*: Would they welcome an extra cess for the purpose?—My opinion is that they would not. They would be very glad to have any improvement of this nature, provided it did not cost them anything. That is the experience we have had with all the union committees, that they are willing enough to spend any money that the district board hands them, but the last thing they want to do is to tax themselves.

66,600. *The Chairman*: I want to get from you rather more particulars than you give us about the arrangements between landlord and tenant for the working of private irrigation schemes. Take first the capital charge: does the landlord as a rule carry out a scheme confined to his own lands, or do a group of landlords come together and undertake a joint scheme?—The district where these schemes are most general is Gaya. These irrigation schemes are very old schemes that have been in existence for a very considerable time; I think some of them existed before our connection with India. There are very few new schemes being worked out. What happens is that there are long systems of *pynes* running through a very large number of villages, all the landlords concerned pay shares towards the cost of the upkeep, and they have days arranged among themselves for taking the water.

66,601. We have been provided with information which suggests that the returns in recent years show a marked increase in the area commanded by private irrigation schemes. Do you think that is due to an actual increase or to a change in the classification?—It has not come to my notice, as far as this division goes, and I should say there has not been any very large increase. My experience here is that the irrigation schemes are, many of them, being neglected and passing out of usefulness. Far from being extended, they are deteriorating.

66,602. Do you know any cases of landlords making from the beginning a new scheme during your own period of service in the Province?—No. There have been certain applications under the Private Irrigation Works Act, but I have not seen any or had any experience of any coming to a successful conclusion.

66,603 Do you think there is an opening for schemes of that sort?—I think the real difficulty is that the proprietary interests are getting so sub-divided. Take this district, for instance, where there is continual sub-division; the proprietary interests, I think, are now some 16,000 or 17,000, and they are continually increasing; so that any irrigation scheme must pass through a large number of villages with a large number of proprietors, and the difficulty is to get any working agreement between them.

66,604. Do you attribute the deterioration which has taken place in these schemes to that fact?—I think the best schemes we have are schemes which run through big estates where there is one zamindar to control them; but where they pass through various estates and the proprietors consist of a large number of members belonging to the same family, and that sort of thing, the chance of cohesion is very small.

66,605. Has it ever been suggested that Government should take over these private schemes?—No, I have never known that suggestion made; but, of course, if they could be brought under some such control, it would certainly be a great benefit.

66,606. So much for their construction: now as regards the method of charge; in no case, I take it, is the water as such sold only to those tenants who wish to take it, and not charged for to those who do not wish to take it?—No, it is never done in that way. The irrigation charge, as I tried to explain, is included in what we call the rent, and whether a man gets it or not, he pays his half, and if the irrigation scheme is neglected, he pays his half. Then when he comes to get a commutation into a cash rent, he is opposed at every turn on the ground that if he is given a cash rent the landlord would have no inducement to keep the scheme up. So the thing goes on. The result is that the general tendency is for the tenant to apply for commutation and the landlord to oppose it.

66,607. You have made plain to us the manner in which, in your view, the system of produce rents tends to diminish the value of these irrigation schemes. Mr. Foley, who has been good enough to provide the Commission with a note of evidence* but who is not to appear for oral examination, tells us on page 225 of his note that in his view another factor acting as an obstacle to any improvement in the way of irrigation is that of the permanent settlement; he says it is difficult to see how any improvement can be effected in the present conditions: that is in the permanently settled areas. Have you anything to say on that point?—I would not altogether accept that view, because, of course, the permanent settlement is there to stay, it is a very light tax on the land, and there is nothing in that which prevents the land-

* *Vide* Appendix on pages 225-228.

lords developing their irrigation schemes. I think almost the only hope is to get these schemes under some public control, or such as are worth it.

66,608. I think I have misapprehended the point; I think this refers to Government irrigation schemes. That makes it clear?—Yes, those are different.

66,609. So that the permanent settlement, in your view, does not interfere in any way with the development of private irrigation schemes?—No, because all the schemes are managed theoretically by the landlord, or the man who is holding from Government, and the rate at which he is holding is a very light rate indeed compared with what he gets for the lands.

66,610. Now will you give us your views on the question whether the permanent settlement is a bar or a handicap to the extension of irrigation works constructed and conducted by Government?—I do not see that it is connected very much.

66,611. Unless you wish to put a charge on all the land commanded?—I understand, at any rate in the Government canals here, that the people who want the water pay for it, the rate is fixed, and, as I understand, the rate is a very reasonable rate to which no cultivator really objects, and they are very glad to get it.

66,612. Provided you adhere to that basis of charge for the water, *prima facie* I see no difficulty, but if you wish to embark on an alternative system according to which a definite charge in the shape of an increased land revenue is attached to all land commanded, whether water is taken or not, then I presume the permanent settlement might be an obstacle?—If the land that is irrigated is going to have an extra charge going to Government, then you would have to do away with the permanent settlement, because otherwise the landlord gets the whole of the increase and the State gets none.

66,613. I was trying to understand what Mr. Foley was thinking of because he is not coming here, and I thought perhaps you could help?—I have never discussed that matter with him, and when you read it out, it took me rather by surprise, because I did not follow it myself.

66,614. I will read on: "There are many districts where new irrigation schemes are required and where they could easily be effected by Government to the immense benefit of the people, if only some small return could be secured to Government on the capital expended"?—I see what he means now. What he means really is: do away with the permanent settlement in those areas and allow Government to take the increase that the tenant actually gets. At present when the Government does it, it sells the water to the tenant, and if the rate of the rent goes up, the landlord gets it or else if the rent does not go up the tenant gets it. I do not see what else he could mean; it is bringing the lands directly under Government which he means, I suppose.

66,615. That is taking the view that, apart from the right of the Government to receive reasonable payment for the water provided, Government is also entitled to a fair share in the general increase of prosperity which results from irrigation?—That, I think, must be his view.

66,616. To return for a moment to the schemes of private irrigation, can you think of any private irrigation scheme in the Province which is maintained in first class order and really well administered?—I should think there are one or two in Gaya that belong to the Tikari estate; there are several there which are really good schemes and are well

administered. I think they are rather extensive schemes. I have no acquiantance with any outside that district.

66,617. Could you conceive new schemes of that sort being started co-operatively? Would that be possible?—It is the system of land tenure which I think is the real trouble. You would have to acquire land, and, the cost of excavation being very heavy, it would almost make it like a public canal.

66,618. *Sir Henry Lawrence*: What is the source of water for these irrigation schemes; is it tanks or hill streams or what?—They are mostly hill streams. The slope of the country in Gaya is from South to North, where there is what we call the Chota Nagpur chain of hills. The water comes down in the monsoon and it is held up by *bunds* at different points and then distributed. Then they have another system of *bunding* up a large area of low land with embankments on all sides and holding up the water in a sort of reservoir.

66,619. Both systems are in force?—Yes, but the source of supply is more or less natural in its inception.

66,620. Is the water perennial or does it only last during the monsoon or shortly after?—It only lasts during the monsoon, and, of course, it is only really required till about November for the winter rice; it is mainly due to the monsoon.

66,621. To ensure the safety of the *rabi* crop?—No; it is almost entirely for the *dhan* crop.

66,622. In your note I do not think you make any reference to emigration. Some unofficial witnesses think that emigration is an important subject to be considered by Government for the benefit of the people. Is there much emigration from this Province?—I think there is a certain amount; this division is more or less over-populated, but the people have a great disinclination to leave their lands. I think the people who do go are mostly the landless labourers and they very often come back at the harvesting season.

66,623. Where do they emigrate to?—Calcutta and the coalmines, and then at times to Eastern Bengal to assist in the harvesting.

66,624. They do not emigrate to take up other agricultural lands elsewhere?—No, I do not think so.

66,625. It is purely a labour emigration for industrial purposes?—Yes.

66,626. Is there any restriction on such emigration?—None whatever; they go as they like and come as they like, I think.

66,627. Does any labour go to the tea gardens?—I think very little from this part of the country. From Chota Nagpur a considerable number go.

66,628. Is there any restriction on that emigration to the tea gardens?—I do not think so.

66,629. Do you think anything should be done to encourage such emigration?—It is difficult to suggest anything of that nature; they are bound to follow their occupations; I mean, if there is a demand they will go, provided there are suitable earnings.

66,630. There are restrictions in force in certain Provinces in regard to emigration to the tea gardens, but they are not in force in this Province?—It is all regulated; recruitment is under a regular system. But what I understand you to ask is whether anyone is prevented from going. Anyone who wants to go can go, but the recruiting agency has certain duties to perform and those are performed.

66,631. You know no doubt that in the United Provinces emigration is prohibited from certain districts; there is nothing of that kind here?—Not that I know of. Recruiting agents do not have to have licenses to go into certain districts; I do not know of any district on which a bar has been placed.

66,632. Is there any feeling in this Province that the labour should be retained in order to provide cheap agricultural labour in the Province?—I do not think so; I think certainly in this part of the world there is more than sufficient labour to deal with agriculture.

66,633. *Sir Thomas Middleton*: You express the view that Sabour Agricultural College might be given another chance?—Yes.

66,634. That, any how, there is a case for reconsidering the question of agricultural education in the Province. I understand it is proposed to establish a veterinary college in the Province; would it not be desirable to try and combine these institutions?—I should think it might be quite possible to combine them; the only thing is that of course there is still the agricultural college standing at Sabour, and intact I think. If you were to set up the college here where the veterinary college is being built, it would necessitate building another college, would it not?

66,635. The officer in charge of the Veterinary Department told us that one of the main subjects he was going to teach at the Veterinary College was animal husbandry?—It is very necessary I think.

66,636. It is certainly a subject which interests the agricultural student as much as it does the veterinary student?—Yes, I think that is so.

66,637. It occurred to me there might be some economy in combining the two teaching institutions?—I take it, if we were to start a college now, it would probably be started in Patna where the Veterinary College is; the only reason why I was thinking of Sabour was because the college is already there with the farm attached to it.

66,638. You think that not only the Agricultural College but the public services would benefit if students passing through the college were to enter the Revenue Department?—I thought they might be useful in the administration of *khas mahals*, Government estates and things of that nature, where a certain amount of money is spent on agricultural improvements and things of that nature. They might be trained.

66,639. You have had a great deal of experience, you have been Director of Agriculture in your time, and know the conditions of the Province intimately; would you care to put in a note indicating the directions in which you think it would be useful to the public services if some agricultural education were acquired by candidates for these services?—My main idea in suggesting the reopening of the Sabour college was that if this department is going to develop, there is no reason why it should not train its own staff for some years to come, because, after all, the present idea is to open a certain number of experimental farms, demonstration farms and to demonstrate in the villages themselves. All that pre-supposes, for a Province like this, a large staff, and there is no reason why the college should not train them.

66,640. You think the college would have quite enough work to do for the Agricultural Department in the immediate future?—Yes, if they are going to extend this department. When I was connected with the department, there was a very small staff, with practically no district staff at all, and there was really nowhere to put them in the department. But now that they are developing and setting up more farms

in the districts and also trying to bring home the improvements to the villagers themselves, there should be a number of appointments going in the near future.

66,641. But in a Province situated as Bihar is, would not some knowledge of agriculture be of great value to provincial officers in general?—Yes, I think it would, except that the ordinary provincial staff, as we have it, have very little to do directly with agriculture.

66,642. The point which I wanted to get from you was whether there was, in the condition of this Province, anything which would indicate that some training in agriculture might be of special value?—Of course, the members of the Provincial Services are often deputed to the Co-operative Department and allied departments, where their knowledge would be useful.

66,643. On page 219 of your memorandum of evidence, you refer to a large increase in demonstration farms. I am not clear from the context whether you mean farms run by the department entirely, or farms on the land of cultivators?—I mean demonstration farms run by the department, to bring home to the ordinary cultivators the various improvements. That is what I was thinking of mainly.

66,644. Approximately what number, do you think, would be wanted in a Province of this size?—It is very difficult to say what would be wanted in the end, because it would depend on the success that attended them, but taking the Province as a whole, there could not be any harm in starting with each sub-division having one. A sub-division covers a very large area, and of course if they proved a great success, more could be started in the *thanas*.

66,645. How many sub-divisions are there?—The Province consists of twenty to twenty-one districts, and I should think there must be three to four sub-divisions in each district.

66,646. This would mean about eighty demonstration farms?—If you gave one to each sub-division, you would require seventy to eighty demonstration farms.

66,647. But, in addition, you attach great importance to demonstration on the cultivator's own holding?—Yes, I do; under his own conditions.

66,648. I take it, from your answer on page 221, that the large states in Bihar are in process of fairly rapid sub-division?—In some districts the proprietary interests are getting very largely sub-divided, but in certain districts where they have very big landed estates that is not going on.

66,649. You mention Patna district specifically?—I meant this particular district, where there is a very large sub-division of proprietary interests.

66,650. I understand that the cash rents, where they exist, are settled by some form of court?—Yes, what we call the old cash rents are the original cash rents on which tenants, as a rule, took the holding. Most of them are of very great antiquity.

66,651. When revised, who revises them?—There is a periodical settlement. A survey and settlement party goes round, and when that takes place they do revise the rents.

66,652. The rent then settled takes into account the irrigation facilities provided by the landowner?—Not exactly. When a settlement goes round, it will revise the rent and raise it if necessary, but mainly on the basis of the rise in prices.

66,653. Is no account taken of the water supply?—If a new water supply was put in, they would take account of it, but probably the water supply existed when the rent was originally fixed.

66,654. What I wanted to get from you is whether there is any method by which, when the landowner receives a cash rent, he could be compelled to keep up the water supply?—It is very difficult.

66,655. You see that kind of thing done in other countries?—It is essential of course that he should, but it is very difficult in actual practice. If he took a water rate, then the matter would be simple, but at present, in most of these produce holdings, the rent is not fixed by reason of the water supply.

66,656. I see the strong argument that exists in favour of the produce rent on irrigated land but one wants to get away from the produce rent and on to the basis of cash rents. The difficulty seems to be the maintenance of the water supply, under the cash rent system?—In this particular district of Gaya, where the produce rent is more or less general, the feeling has always been that if you commute you may ruin the irrigation systems. The landlords may say "It is commuted, we have nothing more to do with it, we will not bother", and the tenants will not keep it up. On the other hand, if you do not commute, the tenants come in and say "These systems are neglected, the produce system is a bad one from our point of view". And so, one is placed on the horns of a dilemma.

66,657. There is no remedy at present?—I can see no remedy without some change, that is to say a change of separating the irrigation charge from the rent, in which case there would be no objection to commutation.

66,658. In a district in which both cash rents and produce rents occur, what is the relation between the two? The landlord's produce rent is fifty per cent, and fifty per cent of the produce on the average output of rice in the Province would be something like forty-five to fifty rupees an acre?—It would vary a great deal according to the capacity of the land.

66,659. It would vary with the quality?—Yes.

66,660. How does the cash rent compare with the produce rent in an average case?—They vary a great deal. The old cash rents in the village are quite low, out of all proportion to the value of the holdings. On the other hand, the rents that we have fixed in a number of cases that we have commuted are quite reasonable rents, varying of course with the capacity of the land. Of course, the produce rent is very much higher than the cash rent.

66,661. I am entirely ignorant of what the range of cash rents may be?—I would rather prefer to put it in this way: I do not think the cash rents ever are much more than what we would call one-fourth of the gross produce rents. I am only speaking from guess work. It is certainly never as high as half the gross produce; it might be one-third. It is very difficult to say; they vary so much.

66,662. On page 222, you refer to the appointment of a Development Officer. Do you think that this Development Officer should necessarily be a member of the Indian Civil Service, or would you make the appointment open to any one who had been the head of one of the co-ordinated departments?—It will have to be an appointment to be filled from anywhere, provided you get a person with suitable experience and driving power. It would be no use putting anybody else in.

66,663. On page 223 of the note you say that in this Province, owing to the permanent settlement, landowners are not likely to take a practical interest in the matter of improvement. There is no question about the fact, but is it not in itself a remarkable position of affairs that a permanent settlement, which means that all the benefit of improvement accrues either to the landowner or his tenant, should cause landowners to take no interest in improvement?—My own experience is that they are quite content with the difference between what they pay to Government and what they get in rent from the tenantry. Take the landowners that have very large incomes; I do not think they want to go into the matter further.

66,664. They have got enough, and there is no incentive to improve?—I am referring to the big estates that draw very large incomes. There, there is no particular personal incentive. The owners of those estates practically have as much as they want.

66,665. *Mr. Calvert*: From the revenue officer's point of view, is this amendment of the Public Demands Recovery Act in this Province, permitting the recovery of contributions to a society in liquidation as an arrear of land revenue, successful?—There have not been a very great number of liquidation cases to judge from, but I think, if I understand what you mean by 'successful', that the Certificate Department is more likely to recover it than any other department, if it can be recovered.

66,666. Does it throw much work on the Collectors?—Not at present.

66,667. It has not presented any very great difficulty?—It has not, except the difficulty in collecting; it is much more difficult to collect.

66,668. There is no congestion in the Collector's office?—Not at present,

66,669. On page 221, the argument in favour of the share system of rents is that it leads to mutuality of interest between the landlord and the tenant. I gather from your replies, however, that it has not proved true in this Province?—My idea is that this system is successful when more land is to be developed than there are cultivators, but when there are more cultivators wanting land, the shoe is on the other foot.

66,670. This is really an indication of the strong position of the landlord *vis-a-vis* the tenant?—A very large number of commutation cases come before me, and my experience is that I never have an application for commutation from a landlord. They always come from the tenants, and every application is opposed. I judge from that fact that the system is liked by the one side and not by the other, taken on the whole. There are two things in the main which the tenants dislike about it; one is the collection work, which means a large staff has to be employed, and there is a good lot of peculation on their part and the landlord does not get his full demand; the second thing is the question of appraisement. If a landlord goes round and appraises a crop at so much and the tenant disputes it he takes the case to the civil court, which is a vexatious and expensive business for the tenant. The one real thing that the tenant does like to know is how much he has got to pay. That is a thing which is uncertain; no one knows what he has to pay each year as rent. It depends on appraisement and this depends on the subordinates who go round and appraise. That is the real root of the unpopularity of the system.

66,671. Division is not done actually on the threshing floor?—It is done in some cases where the *batai* system is in force. To this

system there is not the same objection. The objection arises in cases where the rent is determined by appraisement.

66,672. It has been very clearly and definitely and officially stated that, when introducing the permanent settlement, the Government of Lord Cornwallis intended that rents also should be permanently fixed. Can you tell us how the idea got lost sight of?—I think that has happened in process of time. In this Province, on account of the permanent settlement, we have no large revenue establishment to look into these things; we are divorced from all touch with it; we are not the landlords. In Provinces where you have no permanent settlement, you are in essence the landlords, and you have got to keep up your books properly. Here the landlord is the landlord, and we are merely revenue collectors; that is the reason.

66,673. *Dr. Hyder*: Does it occur in the proclamation issued by Lord Cornwallis that the rents would always be permanently fixed?—I do not know. That statement was put to me.

66,674. *Mr. Calvert*: I quoted from the Orissa Famine Report of 1866?—My answer was with reference to that statement. I have not read the proclamation recently.

66,675. It is quite outside practical politics to get back to that condition of fixing the rents so long as the revenue is fixed?—If you had a revision conducted by the Settlement Department you could revise your rents every fifteen years or whatever period you like, but I do not see any other way of doing it.

66,676. On this question of co-operative societies, do you accept the condition laid down in the Act that the object of co-operative societies should be the economic interest of the members?—Yes.

66,677. We have had it given in evidence that the first function of a co-operative society should be the moral uplift of members?—I do not agree with that.

66,678. On this question of extending societies for the sale of produce, and similar matters, is it correct to say that you consider it desirable that the agriculturist should be sufficiently educated in the economics of his business?—Yes, I think that is one of the essentials.

66,679. Do you think that the education of the agriculturist in the economics of his business should be the function of the Co-operative Department?—If they can find the funds I should like to see them do it.

66,680. In 1920 there was passed a Kamiouti Agreements Act and it was passed in order to secure that by no stretch of circumstances could these people be driven to bind themselves or their families to work for a particular master on a particular wage for longer than a year? Has it proved effective?—It is very difficult to say. I should rather doubt whether it has, because I notice, for instance, that when they come up before me in partition cases there is always a very keen interest to get the working tenants into their shares, the idea obviously being that the man who gets the low class labourers into his share will have some hold on him to get work done. Otherwise it could mean nothing.

66,681. It is also stated in the same Government review that it was hoped that this new system of annual hiring of labour would raise wages. Has it had the effect of raising wages?—Yes, in towns, but out in the interior I still think that the landlord gets his work done at rates which we should think are certainly not economic.

66,682. Does the Act actually serve to increase the wages of rural labour?—I do not think so.

66,683. Then there is a very distinct pronouncement to the effect that "should it be found that, in the absence of special punitive provisions, the Kamiouti Agreements Act is incapable of restoring to the agricultural labourer his right to sell his labour for a reasonable wage, it is the declared policy of Government to strengthen the Act"?—For practical purposes I do not think that anything has been done to give effect to that Act. The Act is on the Statute Book but I do not know whether it means anything more.

66,684. The Act has proved ineffective?—Yes.

66,685. Government has not given effect to its declared policy?—It has taken no special measures to do so.

66,686. *The Chairman*: Is there a system according to which the landlord claims a fee when a tenant sub-lets?—Yes. There is no freedom of transfer in this Province. In many villages he can only transfer with the consent of the landlords and on such terms as the landlords allow.

66,687. As a rule, the terms include a cash element?—Almost invariably.

66,688. Do you use the term *abwab*?—Yes, that is a very familiar term.

66,689. It is explained, in the glossary of the Bengal volume of evidence, as an illegal addition demanded by a superior holder of land from an inferior holder. I do not know whether the first part of the description is right or wrong. Do you agree with the word 'illegal'?—Undoubtedly. The *abwab* really means that. It is an illegal addition to rent.

66,690. *Professor Gangulee*: It is different from *salami*?—*Salami* is a legal thing that a man may take for getting a transfer. *Abwabs* are an illegal addition to rent called by various names in the Province.

66,691. *Dr. Hyder*: You were for some time Director of Agriculture?—For something like two years.

66,692. You have also got much experience of revenue matters?—I have been working in the revenue line for many years as Collector and Commissioner.

66,693. As head of the Agricultural Department your activities were confined to three or four things, to improve existing crops, introduce new crops, to prevent cattle diseases, and to improve agricultural stock. These are, broadly, the duties of the Agricultural Department?—Yes.

66,694. As a revenue officer, you saw the other side of the matter. Could you tell me what has been the effect of this system of produce rents on the improvements which you advocated as head of the Agricultural Department? Where this system of produce rents prevails, do you think the tenant has any inducement to take up, say, an improved crop which you recommended?—I am bound to say that I am entirely opposed to the system of produce rents, but it is inevitable in certain circumstances; I do not think the system is a good one.

66,695. If the Agricultural Department advocates a new crop and the tenant who is on a produce rent basis says that he will have nothing to do with the new crop, do you not think that the activities of the Agricultural Department are to that extent nullified?—I would put it this way. If a tenant thought that he had a good thing recommended by the Agricultural Department, he would experiment with it on his cash paying lands and not on produce paying lands. He would get the full benefit that way.

66,696. He would not introduce it on his produce rent lands?—He would, if he found that it paid him but he would try it first on his cash paying lands.

66,697. The same thing applies to the improvement of the existing crops. Although he knew that by improved methods he could raise more produce, the fact that he would have to share it with the other man would deter him from undertaking the labour. That would be the probable effect?—I would make the same reply, that the tenant would always give his first attention to cash paying lands.

66,698. With regard to the theory on which produce rents are based, that they induce the landlords to maintain the existing system of irrigation, do the landlords, as a matter of fact, maintain them in a state of reasonable efficiency?—It is impossible to give a general answer because there are some systems that are in good order and there are a good many that are neglected and have lost their usefulness.

66,699. Are you not in favour of discarding this theory and, along with it, the system of produce rents?—I would not go so far as to do away with the produce system in a district like Gaya, for instance, unless I were able to do something to maintain the existing irrigation systems in an efficient state. I think, if you could do that, there would be no objection to changing the system.

66,700. *Mr. Calvert*: The quotation I was trying to give you reads thus: "to prevent these people from binding themselves or their families to work for a particular master on a particular wage for longer than one year"?—I do not think it modifies the answer.

66,701. *The Raja of Parlakimedi*: You say that the zamindars of this Province are not very interested in agriculture. Does the Court of Wards create an interest in the zamindars when the estates come into their management?—I think the Court of Wards tries to give the minors as good a training as possible. It sends them to what it considers the best schools and it gives other forms of education.

66,702. What has been the effect?—It is difficult to say. It is a question of individuality. Take for instance Bettiah. It is one of the largest estates under the Court of Wards in this Province. It has been with the Court of Wards ever since I have been in the country and is likely to remain for some time.

66,703. Apart from that, has the Court of Wards opened any model farms in those estates?—There was one farm in Bettiah.

66,704. In the educational institutions to which the sons of zamindars go, is agriculture being taught as a course of study?—I am afraid I cannot say, because that would depend upon the syllabus in any particular school or college to which wards are sent. I am not really conversant with that side of the question.

66,705. Has the Member in charge ever taken any interest in approaching these educational authorities to include agriculture as a subject?—I understand that when a ward is under the charge of the Court of Wards, the latter tries to find out which school or college is most suited to the ward and accordingly sends the ward to that particular institution. But of course the Court of Wards has no business to suggest to the institution that it should modify its course for the benefit of a single person.

66,706. You do not know whether such subjects are being taught in the educational institutions?—Unless you can give me the names of the particular institutions to which you are referring, I am afraid I cannot tell you.

66,707. Take the Raipur College as an instance?—I know that one or two wards have gone there, but I am afraid I cannot tell you what the syllabus is.

66,708. With regard to the increase of revenues in the estates, you have been saying that the zamindars are so contented that they do not even care to further the possibilities of improving their irrigational sources. Do you know what the real reason is for that? Is it because of anything in the Irrigation Act, or some other Act, of which they are afraid?—Not that I know of. I do not think I put it as broadly as that. I said, I think, in my note that their main interest was really that of rent collectors.

66,709. Is the position of the zamindar clearly defined in the Irrigation Act as far as irrigational sources are concerned?—I am not quite sure about that. There is a Private Works Irrigation Act and there is also a Minor Works Irrigation Act, but I do not know of any other Act that is specially designed to help the zamindars in starting irrigation schemes.

66,710. I suppose the ownership of river beds, tanks, hill streams and so on, is well defined?—They generally belong to the zamindar in whose estate they lie, except navigable rivers.

66,711. On page 219 you suggest that demonstration is best done when carried out on the ryot's own fields. Would you also suggest that if there was any loss, it should be made good to the ryot?—That would be a question for the Agricultural Department. If the Agricultural Department was starting a demonstration on the ryot's own land in order to prove a certain thing, I do not see why they should not guarantee to make good any loss.

66,712. Talking about local moneylenders and the way in which they try to keep the ryots in their clutches, I was not clear as to whether the ryot who has to borrow money and who is forced into the moneylender's grip, could not seek relief under the Usurious Loans Act. I want to know whether the ryot is able to seek redress when he is pressed by his creditor, under the Usurious Loans Act?—Litigation and resorting to the courts mean money, do they not? That is the difficulty; if he is sued for his debt he has got to defend himself and he naturally cannot do that for nothing.

66,713. But he can go to the court under certain sections of the Act and say that he has been oppressed?—Yes, but he would have to employ some one to appear on his behalf.

66,714. *Sir James MacKenna*: As a District Officer and Commissioner for a considerable number of years, will you tell the Commission whether you have come across any tracts in which, agriculturally, there has been a marked improvement as a result of the activities of the Agricultural Department?—I cannot say that I have come across any large tract of country where there has been any very marked improvement.

66,715. You lay a good deal of emphasis on demonstration farms. Do you not think that seed farms would probably be better than demonstration farms?—I should be very much in favour of seed farms for the distribution of pure seed.

66,716. Rather than have demonstration farms?—I would like to have demonstration farms as well, but I suppose seed farms would probably be easier to manage and better to start with.

66,717. The result probably would be that you would get large areas under improved seed?—That is so.

66,718. In reply to the Chairman, I think, you said that it would be a very good thing if work of distinction in the agricultural and co-operative branches were recognised by the grant of titles. Have you any local titles of distinction, as apart from the Indian titles of Khan Sahib and so on?—I do not think there are any.

66,719. Do you think that it would be a good thing to institute a title of merit for works of distinction in the agricultural, co-operative and other branches of public activity?—Yes, provided the title of distinction were brought into public esteem. Indians, as a rule, value certain titles more than others, and you would have to make sure that this was one of the titles which they valued.

66,720. In point of fact they have introduced this in Burma?—Yes, if you could get a sort of general value attached to the title then I think it would be a good thing indeed.

66,721. *Professor Gangulee*: In your tours in the districts, what definite agricultural improvements have you observed? You stated a little while ago, if I mistake not, that you had not observed any marked improvement in large tracts. May I know whether you have observed any improvement in small, isolated tracts?—If you go to look for such improvements I dare say you will find them in particular places where demonstrations are carried out, but while going out on tour one does not come across such improvements spread over the country in large tracts. At any rate I cannot recall to mind any large tract of country where it may be said that the whole standard of the cultivation had been raised.

66,722. Do you then think that better crops are being grown in certain tracts now than used to be the case, say, ten or fifteen years ago?—It is very difficult to say, simply on general appearances.

66,723. If the department pursues the policy of conducting demonstrations on the cultivators' own lands, do you think that it will be necessary to have as many as seventy or seventy-five demonstration farms, as suggested by you?—That would simply be a matter of detail. The demonstration farms would be opened and then demonstration would be carried out in the villages and other local areas. That was my idea.

66,724. You are in favour of re-establishing the Sabour Agricultural College? What would be the advantage of having this institution at Patna?—It was not my suggestion that it should be located at Patna. All I said was that, if the question was being reconsidered, then it would probably be advantageous to put it near the veterinary institution, so as to centralise such institutions in one place, but, as the College exists already at Sabour, it seemed to me simpler to utilise what already exists. That is all.

66,725. Do you favour affiliation to the University?—I have no marked views on that point.

66,726. Do you think that more students would then be attracted?—I am inclined to agree that that would be the case.

66,727. One of the reasons for the failure of Sabour was that it failed to attract a sufficient number of students; is that not so?—I would put it in this way, that in its initial stages when it was first started it attracted more students, but these students became disappointed when they found that there were no cut-and-dried appointments waiting for them, and so the attraction ceased.

66,728. Have you any views on the entrance qualifications of the students of the agricultural college?—That would, in my opinion, depend on the lines on which the college was re-opened.

66,729. I understand that the entrance qualification at the time when the college was started was the ordinary matriculation standard, which is a very low standard?—Yes, but that, at the present time, is about as high as you could go as an entrance qualification.

66,730. With the extension of training in elementary science in the University do you not think that you could very well depend on the Intermediate Science as the entrance qualification?—That, I think, would be an advantage; but I was considering whether it would not be bringing in the students rather late if the entrance qualification were to be the Intermediate Science standard. At any rate that is only a matter of detail and I have no opinion one way or the other.

66,731. Do you consider that free transfer of holdings is desirable?—It depends very much upon the point of view from which you look at it.

66,732. I am looking at it from the agricultural point of view and from no other?—Certainly, I consider that to the person who is actually in possession of the holding it is entirely to his advantage to have freedom of transfer; not having the freedom of transfer diminishes the value of his holding.

66,733. Is it a fact that, in this Province, land is passing out of the hands of the cultivators to the moneylenders?—That is rather a difficult question to answer. But I certainly think that in some districts cultivators are becoming small proprietors; in fact you are beginning to get a certain number of large cultivators with small proprietary interests.

66,734. Taking the cash rent as our basis of comparison, could you tell the Commission what is the difference between the amount of revenue which the landlord pays and the rent which he receives from the tenant?—Rather than hazard a guess I had better get you the actual figures for Patna division. I can then give them to you district by district. I will send you the information later.*

66,735. You have, I take it, a large number of intermediaries between the landlord and the tenant just as we have in Bengal?—Of course there are a good number of leases given out on *thika*, but we do not, generally speaking, have the *talukdari* system that you have in Bengal, or such things as *patnis*, *darpatnis*, etcetera.

66,736. We have many sorts of intermediaries in Bengal?—We do not have that to the same extent here.

66,737. In *khas mahals* are the relations between the Government and the tenants regulated by the Bengal Tenancy Act?—Yes, entirely; the only difference in *khas mahals* is that they collect their dues by the certificate procedure and the ordinary landlord must go to the civil court to recover his rent.

66,738. You state that the expansion of the Veterinary Department has been too slow. Could you account for this slowness?—I think the War had a good deal to do with it, and also the creation of a new Province and the necessity of meeting immediate needs like the building of a new University and things like that. The Province is only just beginning to find itself.

66,739. Too many changes?—The Province came into existence only in 1912.

66,740. Besides the closure of the Sabour college, is there any retrograde step, that you can think of, that has been taken by the Agricultural Department?—No; that is the only one that comes immediately to my notice.

66,741. You think it is desirable to have close relations between the Agricultural and Co-operative departments. Could you enlighten the

* *Vide* Appendix I.

Commission on the existing relations between these departments?—At present there is a Registrar in charge of the Co-operative Department and there is a Director of Agriculture; there is no direct relation between them, except such as they choose to make, personally. There may be some relation through the Minister, but I do not for the moment know whether the same Minister is in charge of both the departments.

66,742. You consider that there is no adequate supervision and control of the societies. What control do you mean?—Audit chiefly. What I think is, if you want to get the confidence of the public you must make their money safe.

66,743 Could you express an opinion on the excessive sub-division of holdings which, you consider, means a great deal of loss in agricultural efficiency?—In the present state of public opinion it is difficult to stop it. The landlord need not himself recognise sub-division of holdings, but in practice he does; and if he chooses to recognise it the holding can be split up to any degree.

66,744. What would be the serious handicap in introducing legislation?—Anything that touches tenancy legislation meets with tremendous opposition in this Province, because so many interests come into conflict.

66,745. Was there any Bill to amend the Bengal Tenancy Act?—A Bill was brought in the last session of the Legislative Council, and I understand the landlords also are going to bring in a Bill, and these may be discussed in select committee next July or August.

66,746. I wish to turn once more to the note of evidence given to us by Mr. Foley. In discussing irrigation he says if only Government could secure some return for its capital, in the form of increased land revenue, it would not be difficult to make the whole of south Bhagalpur and South Monghyr practically immune against famine and scarcity. Do you agree with that view?—Taking the canal systems that exist here, the Patna-Ganges canals, I understand that they are remunerative on the existing terms. I believe there are some canal systems like the Tribeni canal in Champaran which are protective and not remunerative. Without estimates, I cannot give an opinion on the question whether it would be possible to build remunerative canal systems in South Bhagalpur and South Monghyr.

66,747. Some non-official witnesses have said that control of irrigation should be taken away from the zamindars and have suggested the formation of district irrigation boards; do you favour that?—I do not. With the present zamindari system I do not think it is possible because I do not see, without intricate legislation, how district irrigation committees could have any control over conflicting zamindari interests.

66,748. There again the system of land tenure is against you?—Yes.

66,749. What is the attitude of district boards towards education, sanitation and so on?—They are all for putting up more hospitals and building more schools as far as their funds will allow, rather to the detriment of other activities. I mean, they are not at all slow about spending money on these two sides, medical and education.

66,750. What is their attitude towards communications?—As regards communications, they are quite reasonable if there is money; education and medical come first, communications second and I think veterinary comes third. For instance, one of the boards in this division had to economise the other day; they proposed to shut down two veterinary hospitals.

66,751. Although these people are supposed to have a passionate desire for "cow-protection"?—I do not know.

66,752. Could you tell us how the union committees and boards function?—I do not think, personally, that they are functioning much; they are not functioning on what I call the true basis, that is to say, they will not tax themselves for their own special needs. They are quite willing to spend as much money as is given to them by the district board.

66,753. The Village Self-Government Act empowers them to tax themselves?—Having themselves to decide that matter, they do decide not to tax themselves.

66,754. On the question of emigration, do these landless labourers emigrate with their families, or do they emigrate alone?—Mostly alone, from this part of the world.

66,755. *Mr. Kamat*: Would you, as a revenue officer, agree with this remark in the Administration Report of the Local Government: "Nearly half the total outlay of the boards and most of the boards' own resources were spent on roads, bridges and buildings. On the whole, the new boards are discharging their obligations towards communications fairly well"?—I cannot speak for other divisions besides my own, but I think, as far as this division goes, they certainly are willing to spend what they have on communications, but I think their interest lies mainly towards medical and education.

66,756. Having spent half on communications, they are keen on spending the remainder on education and medical?—I think it is a provincial figure; I do not think it would apply to every district in detail.

66,757. On the question of permanent settlement, as a revenue officer would you say, speaking broadly, that that settlement and the tenancy systems are really hindering agricultural progress in this Province?—Well, it is a difficult question to answer. Do you mean whether we would have advanced further without the permanent settlement?

66,758. You can put it that way, if you like?—I think it is quite possible we might have; but it is very difficult to say what would have been and what would not have been.

66,759. Is there any consciousness growing among the landlords or the tenants, or amongst both, that the utmost possible production of wealth is not being extracted from the land owing to the present system of settlement?—No; I do not think I have ever come across such an expression of opinion.

66,760. You referred to a Bill which is coming on in the next session of the Council?—I was referring to a Bill which was referred to a select committee at the last session of the Council and which will be discussed in select committee and then come before the Council subsequently. I cannot say, exactly, when it will come. That is a tenancy Bill.

66,761. Are any attempts being made to bring home to the tenants or to the landlords that if the system were changed there would be more money available, and a higher production of wealth which would conduce to the welfare of the Province as a whole?—I am not quite sure that I understand what you mean by 'attempts'.

66,762. That point has been emphasised in the Administration Report of this Province. But is any attempt being made to give greater publicity than this report gives to the comparisons mentioned in the Administration Report? I want to know whether any attempt is being made to educate public opinion on this point?—I do not think there is anything in the nature of a publicity department.

66,763. A comparison is drawn between the finances of your Province and of two other sister Provinces; for instance, it is pointed out in the

Chapter on "Finance" that, whereas the land revenue of the Province of Bihar and Orissa is Rs. 1,64,00,000 for an area of 83,000 square miles, the land revenue, for instance, of Bombay is something like Rs. 5,00,00,000 for an area of 1,24,000 square miles; therefore over a population of nineteen millions Bombay can spend on education two crores, whereas your Province is able to spend only seventy-six lakhs on education, over a population of thirty-four millions. Is it a fact that it is because of the permanent settlement that the Province is able to spend comparatively little on education and, if so, is this brought home to the landlords and tenants?—No special measures are taken to make that report public. It is open to the public; I suppose the members of the Legislative Council and other people read it; but besides that, I do not think any special measures are taken.

66,764. *Mr. Calvert*: Is it correct to say that Government do not accept any responsibility for that report now?—I understand that that is so.

66,765. It has ceased to be a Government report?—It has ceased to be a Government report. It is a report which is compiled every year; some one is put on special duty to compile it.

66,766. *Mr. Kamat*: Do you mean to say that Government publish this report under their authority, but do not take any responsibility for it?—I do not know what point of view they take, but it is published by Government.

66,767. *Professor Gangulee*: It is considered to be the general Administration Report, is it not?—There is a preliminary note explaining this particular point.

66,768. *Mr. Kamat*: True, every little statement contained in this report as written by Mr. Collins, its compiler, might not be accepted by Government, but do you mean to say that the general policy contained in this report is not accepted by Government?—I am not in a position to say. I have nothing to do with the report.

66,769. Would you think that if greater publicity is given to these comparisons, it would not be to the benefit of the people as a whole?—Any publicity is to the good, but the difficulty is how to do it. I do not quite see how that is going to be brought home to every tenant in the Province.

66,770. *Professor Gangulee*: Or to every landlord?—Yes, or to every landlord.

66,771. *Mr. Kamat*: Do you think that the people would be unreasonable if they came to know, on facts and figures, that they themselves could get better roads and hospitals if they produce more wealth from the land and pay better assessments?—I presume their representatives in the Legislative Council are aware of these facts.

Are they?

66,772. *Mr. Danby*: From an agricultural point of view, do you consider that North Bihar is of less importance than South Bihar, for instance, Chota Nagpur?—No. I think North Bihar itself has a very considerable importance indeed. My note refers mainly to the division in which I was serving.

66,773. Do you know why the work done by the Agricultural Department has been practically confined to the south of the Province?—No, I have no idea at all, unless perhaps the impression is that Pusa, being on the north side of the river, to some extent takes the place of the Agricultural Department.

66,774. When you were stationed in North Bihar, did you find that the Sipaya farm was of any benefit to the cultivators?—I understood

that it was generally useful and appreciated. At that time I think it was a cattle breeding farm.

66,775. Do you consider it is a suitable site for a farm to which cultivators could go and see the work that is done there?—It is merely for the people living in that part. I do not know whether it is the best site. I did not select it myself. It was selected by some one who came after me.

66,776. Do you think that a demonstration farm near Pusa, which could have assistance from Pusa, would be an advantage?—I think it would certainly be of very great advantage.

66,777. Do you think that the permanent settlement should rather encourage landlords to develop irrigation schemes or other schemes which would benefit their property?—I was talking of permanent, as distinct from temporary, settlements. I mean that the demand from Government being fixed, the zamindar has every incentive to develop his property, whereas if it is only a temporary settlement he would never have the same interest. That is what I really meant.

66,778. Where the rent is commuted from rent paid in kind to cash rent, I believe it is usually done on the basis of a twelve years' average?—What we do now is that we take a ten years' average, then we take the prevailing cash rent, and try to fix a figure with some relation to the two. But our main difficulty (I am speaking of the division on this side of the river) is to get collection papers filed. Neither side produces them, and we have to find out what the value of the produce is by crop experiments.

66,779. The rents fixed have rather tended to deter the cultivators from having their rents commuted from rents paid in kind to rents paid in cash?—Not on this side of the river, although the rates fixed are on the high side.

66,780. For the better upkeep of the roads, would you recommend the levy of a tax on bullock carts in the districts?—I think it would help considerably to provide funds for the better upkeep of the roads. Only, the tax, if it was levied, would have to be earmarked for the roads and the roads only.

66,781. Whenever improvements in roads are asked for, it is always said that there are no funds available. A very small tax on bullock carts should provide the necessary funds for the upkeep of the roads?—That would be so if the money was earmarked for the roads. The trouble at present is that the local bodies that are spending this money can allot it in whatever proportion they like to schools, medical relief, roads, et cetera. It is all in one general fund.

66,782. *The Raja of Parlakimedi*: As regards the commutation of rent from kind to cash by the zamindars, cannot the cultivator raise any objection under any regulation?—What I tried to convey was that the only person who ever applies for commutation is the cultivator. I have not yet had an application from a landlord.

66,783. But in the case of lands where rent is paid in kind, the zamindar sometimes collects it in the shape of money, by fixing it himself?—That is done by way of convenience. They estimate the crop at so many *maunds* of grain, then they say the market price of the grain is so much, and convert it into money, and the tenant then, as a matter of convenience, pays that amount in money, instead of actually delivering the produce. Strictly speaking of course he can take the produce, but from the point of view of both it is more convenient to take the money.

66,784. The parties, especially the zamindar, are interested in seeing whether the transaction is done fairly or not?—As in all things, there may be disputes. If he is a good zamindar, the matter is amicably arranged and there is no dispute. If there is a dispute, the case goes to the court, and both sides are involved in litigation.

66,785. *Sir Henry Lawrence*: I did not understand your reply to Mr. Danby. Do you agree that more money is required for the upkeep of roads?—Certainly so, especially since the development of motor traffic, which wears the roads very badly.

66,786. You agree that such money could be found by a tax on motor cars and bullock carts?—Motor cars, as a whole, are taxed; at any rate, they are taxed in the towns. For instance, in Patna, we pay a tax on motor cars.

66,787. But this is for district roads, is it not?—But then most of the motor cars are owned in the towns. For instance, most of the motor services have their headquarters in the towns, and they run out into the districts.

66,788. To whom do those revenues go?—At present they go to the local body concerned, the municipalities as a rule.

66,789. We are talking about district board roads. Is there any means by which district boards can secure revenue from motor cars?—I do not think they can.

66,790. Do you agree that they should?—Personally, I think that the system should be somewhat similar to what it is in other countries; that is to say, it should be a provincial tax, because motor cars do not necessarily stay in the town; they go out into the districts, though their main residence may be in the towns. I cannot see any other way of distributing the money.

66,791. The tax being collected by the Provincial Government, you would give grants from it to the district boards for the upkeep of the district roads?—I should be very much more inclined, if this question is under discussion, to provincialise the main leading roads, and have funds for that purpose.

66,792. Is there any such proposal under consideration?—Not that I know of. I believe, however, that a committee is now sitting in connection with the improvement of transport facilities in India. As a matter of fact, it is a very big problem.

66,793. Do you also support Mr. Danby's proposal for a tax on bullock carts?—Yes, provided, as I said, that the money goes to the roads.

66,794. Is it not possible to secure that?—Not under the existing system, because if the district board collects it it would go into the district fund, and then the district board would have the benefit of the money for any work of public utility. If you collected a tax on bullock carts and put it into the district fund and earmarked it for roads, they might spend the money on roads, but at the same time they might spend the money which they ordinarily spend on roads on other things. At present they get a certain amount voted for the roads, but supposing you made a special collection for roads, they might say: "other demands are very urgent, and we will not spend on roads anything beyond this special amount".

66,795. *Sir Thomas Middleton*: Are bullock carts allowed on the metalled roads of the Province?—Yes.

66,796. I have been along some of the roads, and I have seen separate tracts at the side of the metalled roads for bullock carts?—That is on the north of the river. Most of the roads are not metalled there, and

they have a separate tract by the side of the roads for bullock carts. But down south of the river where there are metalled roads, as far as I know, the carts can go anywhere they like.

66,797. *Professor Gangulee*: What happens to the road cess?—It goes to the district boards. That is how they finance everything.

66,798. Entirely?—Yes. It used to go half to Government and half to the district boards, but now it goes entirely to the district boards.

66,799. *Mr. Calvert*: Would you be prepared to say that communications in the Orissa Division are now complete enough to preclude the possibility of a serious famine?—I am afraid I cannot answer that, because my knowledge of Orissa is very limited. I have never been posted in Orissa.

(*The witness withdrew.*)

APPENDIX I.

Statement showing the total Government revenue and the total cess valuation.

District.	1926-27 Revenue demand of revenue paying estates.	1926-27 Cess demand of revenue paying estates.	Cess valuation.
Patna	15,70,651	5,66,715	93,50,797
Gaya	14,96,619	10,52,879	1,73,72,503
Shahabad	19,24,561	5,11,487	84,39,535

APPENDIX II.

Additional Note on Irrigation, by Mr. B. Foley, I.C.S., Board of Revenue, Bihar and Orissa.

In Bihar and Orissa landlords are usually unable to combine to carry out an irrigation scheme which the majority know will benefit them. I can cite three instances, two in Palamau and one in south Bhagalpur, where through the energy of the District Officer certain landlords were induced to combine and projects were constructed on capital contributed by them, with a donation from Government. All three schemes proved a failure, as the landlords either did not fulfil their undertakings or failed to provide the necessary funds for upkeep. Often applications are made to Government to construct works of irrigation and recover the cost by a water rate. I believe these schemes and many others could be carried out by Government, if the Province was not permanently settled.

2. My instance No. 6,* the Khora valley scheme in Shahabad, may be taken as an example. This was partly drawn up to secure this part of the district against famine, but it is probable, owing to various causes, that famine will not occur again here. Suppose no danger of famine exists. The figures are probably too favourable, as the receipts will probably be less and the expenditure more than was anticipated. Assume, however, that the figures are correct. Government is asked to spend twenty lakhs on certain irrigation works, and a water rate will be imposed on the lands benefited. Government will receive no return on the capital for nineteen years and after that less than a quarter per cent. The landlords and tenants of the lands benefited will be enriched. Is Government justified in spending twenty lakhs of the general tax payers' money with so small a return merely for the benefit of certain landlords and tenants in a small area? I should say it was not. The only return Government will receive is the water rate: the land revenue is permanently fixed and remains the same as before.

3. If, however, the revenue of Shahabad were not permanently fixed, there would be a revision of revenue settlement every twenty or thirty years. By this revision Government would receive a share in the increased wealth of this part of the district. The landlords' rents would be ascertained or assessed and a proportion would be taken as Government revenue. The landlords would be receiving much higher rents from the tenants, and the tenants much larger crops from the lands. Thus Government would receive a share in the increased prosperity. If the assessment were equitable the Government revenue would not be felt by the landlords or tenants. It could besides be raised or lowered according to the water rate paid.

4. I do not believe the Government of Bihar and Orissa will ever be properly recompensed for the capital expended, if it depends wholly on a water rate. I had occasion to examine this subject when reporting on the proposals of the Indian Taxation Committee dealing with irrigation. The Son Canals in Shahabad, Gaya and Patna have been a disappointment as far as revenue is concerned, and the Orissa Canals have mostly worked at a loss. There seems no possibility of raising the rates, since the people would refuse to pay them.

**Vide* page 227.

5. I should like to refer also to instance No. 3 in my answer. Government were asked to spend a lakh of rupees on draining a big marsh. The project is feasible and, were the marsh drained, the landlords and tenants would be enriched. Government would not, however, be justified in spending a lakh of rupees of the taxpayers' money merely in order to enrich these landlords and tenants. If Government after so many years, was assured of a higher land revenue from these lands, which would give a tolerable return on the capital, Government would be justified in incurring the whole or a considerable portion of the expense. The land revenue being permanently fixed this is not possible.

6. I believe it is not commonly known how insignificant the Government land revenue is in Chota Nagpur. The district of Ranchi, I believe, is over seven thousand square miles: the land revenue paid to Government (apart from some petty estates held direct by Government) is between fourteen and fifteen thousand rupees. If Government financed an irrigation scheme, which benefited part of this district, very little return on the capital would be obtained from a water rate, and the rest of the Province would have justifiable reason to complain that money derived from them was being spent on a district which practically paid no land revenue.

7. Since I sent my answer to the Royal Commission I received information that the same thing was experienced in the permanently settled districts of the Benares division. Improvements could not be effected here in the same manner as in the temporarily settled districts of the United Provinces, since Government would not receive any return in the form of increased land revenue on the capital expended.

8. With regard to Mr. Heycock's evidence I should like to point out that I am making no proposal to abolish the permanent settlement of Bihar and Orissa, or to except from it any areas benefited by Government schemes of irrigation. I am merely pointing out how very much more difficult it is for Government to finance such schemes in a permanently settled than in a temporarily settled Province.

COPY OF LETTER NO. 6-12/12, DATED THE 14TH OCTOBER 1927, FROM THE SECRETARY TO THE BOARD OF REVENUE, BIHAR AND ORISSA, TO THE SECRETARY TO THE GOVERNMENT OF BIHAR AND ORISSA, REVENUE DEPARTMENT.

SUBJECT:—*Indian Taxation Enquiry Committee's Report, Chapter V.—Charge for Water*

I am directed to acknowledge the receipt of your No. 325-R. R./IIIE-26, dated the 27th May 1927. Mr. Heycock as Member of the Board of Revenue consulted the five Commissioners and asked that the Collectors of Muzaffarpur, Champaran, Bhagalpur, Monghyr, Cuttack and Balasore and the Deputy Commissioners of the Santhal Parganas, Ranchi and Palamau should be consulted. I am to enclose in original the replies received from these officers.

2. In the first place Government desire an expression of opinion from the Board on the point raised in paragraph 3 of the letter from the Government of India, dated 28th February 1927. This paragraph deals with the ninth recommendation of the Committee, page 113 of the Report, *viz.*, the imposition of owners' rates. The Board agrees that theoretically, where a guarantee of the supply of water is newly given, it is legitimate to make a charge on the owner, *i.e.*, the landlord, as well as on the occupier, *i.e.*, the tenant of the land, for the use of the water.

If the land is waste and if Government supplies water making the waste cultivable and the landlord thereby receives substantial rents from his tenants for cultivated land instead of nominal rents for waste lands, it seems obvious that the landlord ought not to obtain the full benefit of his enhanced rents without paying at least some portion to Government.

2. As regards the Province of Bihar and Orissa, however, it appears to the Board that the question is an academical one. In the case of large irrigation schemes in the Province it is not possible to increase the present rates by the imposition of owners' rates and the Local Government would as a rule be only too pleased if what is stated in proposal (2) paragraph 138 of the Report as the minimum charge could be recovered in every instance, *i.e.*, the cost of the maintenance of the irrigation work *plus* interest on the capital cost. A description of the Son Canals is given in pages 77 to 83 of the Shahabad Gazetteer revised in 1924. It is there stated that for many years the canals had been unremunerative and it was only during recent years that the return on the capital expenditure had exceeded four per cent. At the end of 1921-22 the total capital expenditure was Rs. 2,68,98,109 while the net revenue for the year was Rs. 15,37,513 yielding a return of 5¾ per cent. The report on irrigation for 1925-26 shows that the Son Canals gave a return of 6·42 per cent on the capital cost and of 4 per cent on the capital added to the arrears of interest. It is instructive in his connection to refer to the Khora Valley irrigation project for the irrigation of a portion of the Bhabua sub-division framed by Mr. Hudson. It is possible to regard this scheme partly as a measure for protection against famine, but it was estimated that the expenditure would be Rs. 18,79,600 and that no return would be received for nine years, a return of Rs. 1,408 after the thirteenth year, and finally a return of only Rs. 2,908 after nineteen years. There is reason also to believe that this estimate is too sanguine.

4. Besides this the imposition of owners' rates, as far as the Board can see, would only be possible in produce-rented lands, unless the tenancy laws are altogether altered. If a new canal were made through produce-rented lands, both the landlords and the tenants, as is customary, would pay the water rates, and if the produce rents were subsequently commuted, the rates could be adjusted so as to impose a fair rate on the landlord. In cash-rented lands the owners' rate could not be imposed, since under the Tenancy Acts in force in the Province the landlord would not be legally entitled to raise the tenants' rents in consequence of any canal supplied by Government. If the law in force is strictly followed, therefore, the whole of the benefit of the new canal would be received by the tenants. Actually the landlord would probably manage to raise his rents by some means or other and the tenant would probably be quite willing to pay the landlord some increase, but it is difficult to see how Government could consent to benefit from such transactions. It is true that in the case of minor works under Section 24 (1) of the Minor Irrigation Works Act, a landlord can enhance his rents but under Section 19 of this Act the local Government can only recoup itself for the expenditure it incurs: it cannot raise revenue in excess of this. Since Section 6 requires the consent of one half of the owners, this consent would probably never be obtained if any attempt were made to impose an owner's rate as described. The view of the Board is therefore that in this Province, where the Government revenue is permanently settled, the imposition of an owner's rate would not be feasible.

5. With regard to the temporarily settled areas in Orissa the matter is different. The Orissa Canals are described on pages 94 to 105 of the district Gazetteer of 1906. They were intended partly for navigation as well as for irrigation and also as a protection against floods. The

sanguine hopes of a high return on the capital expenditure were not realised and the outlay up to the year 1906 has been unremunerative. Up to 1900-01 the working expenses were not covered by the receipts and in the succeeding two years were only slightly exceeded. Up to 1902-03 the total net revenue had only amounted to 0·17 per cent of the capital outlay. The report on irrigation for 1925-26 shows a return of only 0·41 per cent on the capital outlay, and of 0·14 per cent on the capital outlay *plus* the accumulated arrears of interest. The opinion of Mr. Maddox, quoted at page 104 of the Gazetteer, is that it was not generally possible in Orissa for a landlord to enhance his rents on account of irrigation. This is confirmed by the present Superintending Engineer, Orissa Circle, who considers that artificial irrigation in Orissa is not popular and water is generally taken on long termed leases merely as a safeguard against a year of bad rainfall and drought: if there is any further increase, it would induce the cultivators to refrain from using the canal water. The Collector of Balasore states that the area irrigated in his district is small and it is difficult to decide how far the value of the land is increased by irrigation; there is little ground to justify the enhancement of the water rate.

6. On the other hand the Board desires to call attention to the remark in paragraph 4 of the letter from the Collector of Monghyr that the openings for improvement by means of irrigation in this Province are practically unlimited. There is no doubt that an enormous improvement in the Province could be effected by irrigation. There are excellent schemes that could be framed for south Bhagalpur, south Monghyr, the Santhal Parganas, Gaya, Shahabad, Palamau and Saran, and probably other districts, if Government could advance the money and were assured of a return that would merely cover the cost of maintenance, *plus* a reasonable interest on the capital cost. In a permanently settled Province like Bihar and Orissa, however, this cannot be assured. By a well framed irrigation scheme, the landlords and tenants in the districts mentioned would immensely benefit but it is difficult to impose rates, under any system, that would give this return to Government, though this is what the Indian Taxation Enquiry Committee regard as a minimum charge. Did the permanent settlement not exist, it would be easy to obtain for Government considerable additional revenue.

7. The second question on which the Board's opinion is sought is on the Bill introduced in the United Provinces Legislative Council in 1925 to ensure that the water rates in that Province should vary regularly with the average wholesale price of the crop or class of crops. The Board agrees with the officers who have reported on this subject, that it is altogether premature in the present state of Bihar and Orissa to consider the applicability of such an Act. In existing conditions it would be impossible to pass the Bill and impossible to administer it, if passed.

Babu ARIKSHAN SINHA, Pleader, General Secretary, Bihar Provincial Kisan Sabha, Muzaffarpur.

Replies* to the Questionnaire.

PRELIMINARY NOTES.

This *Sabha* is mainly concerned with the agricultural tenant class holding and cultivating tenancy holding. We are concerned

* The evidence represents the witness's own views and not those of the Kisan Sabha.

also with agricultural labourers. These people are very poor, depending entirely upon agriculture. We have nothing to do with big factories. Therefore the opinions expressed in this paper will be from the experiences of the actual cultivator class. I am myself a cultivator having in my *jote* a considerable area of tenancy lands producing paddy, wheat, barley, *makai*, *rahar*, *moong*, *urid*, *sarson*, *tisi*, potatoes, sweet potatoes, and other minor crops. The main produce of my land is paddy, wheat, barley, *makai* and *rahar;* the other crops are subsidiary crops. I myself supervise my cultivation affairs and the kind of crops sown in each class of lands is according to my own direction. Therefore as a humble cultivator of lands I have a fair experience of the cultivating class but not as a scientific or research expert. If the Commission wishes to hear the views of poor cultivators living in villages I will place them before them. But if they will satisfy themselves with the view points of big factories and capitalists and business men, they are welcome to do so. Frankly speaking, the working committee of the Bihar Provincial Kisan Sabha met several times in my house to discuss the matters connected with the Royal Commission on Agriculture and the views of the committee were expressed in resolutions already submitted to His Excellency the Viceroy and His Excellency the Governor of Bihar and Orissa and the receipts thereof have already been acknowledged from the quarters concerned. His Excellency the Viceroy showed deep solicitude for the welfare of the poor agricultural community and asked us to appear before the Commission with the grievances of the cultivator class. The Joint Secretary of the Commission sent me a copy of the Questionnaire in the latter part of 1926 for replies, but the leading members of the *Kisan* movement met in my house several times and were of the opinion that they do not expect much benefit from this Commission for the cultivating class and they were of opinion that they have not much faith in this Commission so far as the interests of the *kisans* are concerned. I informed His Excellency the Viceroy and His Excellency the Governor of Bihar and Orissa about the views of the *Kisan* leaders and implored them to co-opt at least one *Kisan* representative on the Commission when the Commission visited Bihar and Orissa. But His Excellency the Viceroy regretted that it was too late to accede to the request of the tenant class and asked us to content ourselves by appearing as witnesses before the Commission and expressing our views there. As I have already said that the *Kisan* leaders do not expect much benefit to the tenant class from this Commission and as the Government are not prepared to recognise them as a class worthy of recognition by the Government, it was decided that it would be useless to waste our energy on a Commission from which no benefit is expected for the poor cultivators and consequently no reply could be sent to the Questionnaire sent by the Joint Secretary to the Commission. But now the Bihar Government has thought it proper that the Commission should hear the views of the cultivating class as well and, therefore, in consultation with some leading *Kisan* leaders I submit the following answers to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) Frankly speaking, the tenant class, otherwise called the *kisans*, have not in the least been benefited by any research whether general or veterinary. The Pusa Research Institute has been of no benefit to us. We do not know what good it has as yet done for the poor ratepayers, particularly the tenants, although it has devoured a huge sum of money in its huge buildings and big establishment. It maintains a large number of cows and a few bulls and sells the cows' milk in the bazaar at four annas per *seer*. In our opinion this Pusa Research Institute has been a sheer waste of public money without any "*Ma Bap*" to enquire into this

huge wastage. Similar is the case with the Tirhut Agricultural Museum at Muzaffarpur in which the agricultural class has absolutely no representative. We do not know what good it is doing to the tenant class and who are its members and who has the power of nominating members to it. Many years ago, that is in 1918 or 1919, the Magistrate sent for me and asked me to accept the secretaryship of the agricultural association and to co-operate with him in doing some good to the poor peasantry. I accepted the secretaryship and worked for some years till it actually ceased to exist and function. That association was not the Tirhut Agricultural Association of which I understand the president is the Commissioner of Tirhut Division. An officer of the Agricultural Department was co-operating with us. The Magistrate, the agricultural expert and my humble self made enquiries from different localities and supplied the best Pusa improved seeds to cultivators for sowing in their fields. But, strange to say, the Pusa wheat did not germinate in many places and thus hundreds of rupees were wasted. I also made experiments in my own fields with no better results. The result was that cultivators gave up the Pusa wheat seed in disgust and continued their old country seed which is yielding ordinary produce. I had invited a large number of *kisan* leaders of the district to become members of that association and popularise the Pusa seeds and try for the improvement of agricultural produce with the help of Pusa seeds and Pusa research. But the whole thing proved a failure. The Magistrate was transferred. The Pusa seeds and research proved a failure and the *Kisan* members left the Agricultural Association in disgust as they were laughed at by the village cultivators owing to the failure of the Pusa seeds, and the association ceased to exist. The Magistrate was its president, since then we do not know what benefit the Pusa research and the Tirhut Agricultural Association have been doing to the cultivator class. My suggestions are these:

There should be in each sub-division one agricultural expert at least and there should be a sub-divisional agricultural association. Members of the association should be men who have got sufficient experience of agriculture. The association should be filled by men who take keen interest in the welfare of agriculturists and in the improvement of agricultural produce. The agricultural expert with the assistance of the members of the sub-divisional association should visit rural tracts, should come in contact with the actual cultivators of the soil, discuss with them the desirability of improving the fertility of the soil and produce crops yielding a substantial income. The agricultural expert should explain to villagers the experience he has gained by his researches, advise villagers how to improve the productive capacity of their lands, and what crops can with advantage and profit be grown in a particular class of land. He should often visit the locality where he has advised the growing of a particular crop and report the result of such research to higher authorities. There should be an arrangement for the supply of improved seeds on payment or on credit to villagers who should be taught how to improve the fertility of their soil. The masses do not believe that Government will do anything to improve the lot of the poor starving peasantry. The peasants are regarded as so many untouchables in India. In my opinion Government officials should inculcate in their minds that these officials are the peasants' real benefactors.

(c) I suggest that an attempt should be made to make research into the question of improving the productive capacity of land, which has much decreased in these days. I personally remember that there was a time thirty years ago when we used to get produce

at twenty *maunds* per *bigha* and now in that very land the produce is not more than five *maunds* per *bigha*. The result is that now the peasants are starving. An attempt should be made to solve this problem. Research in this direction is absolutely necessary and as a result thereof the State should see that the peasantry produce a sufficient quantity of grain to support their families. Agriculture is becoming unprofitable in these days and so poor people are running hither and thither for service. India is purely an agricultural country, but the most neglected interest by the Government is that of the agriculturists. Nobody cares for these poor starving people. Government ought to come to the help of these poor people and spend money for the improvement of the productive capacity of agricultural land. The District and Sub-Divisional Magistrates should visit the rural tracts, come in contact with the cultivator class, acquaint themselves with their needs. Experiments and research should be encouraged in important centres in rural tracts and villagers attracted to them.

QUESTION 2.—AGRICULTURAL EDUCATION.—I do not know any agricultural educational institution. To my mind no such institution exists in Bihar except Pusa, which is unapproachable for poor agriculturists. Even Sabour College is not in existence now. I have no experience of Sabour College even. Agriculturists have no faith either in Pusa or Sabour, or the farm at Kanke in Ranchi. I visited Kanke once in 1921 when I was a nominated member of the Bihar Tenancy Bill Committee, at the request of the Director of Land Records and the Revenue Secretary. But I regret I could not be convinced of any actual good that the Kanke farm had done to the peasantry.

(i) As no agricultural school is known to me I cannot say whether the supply of teachers is sufficient.

(ii) In my opinion there ought to be agricultural schools in important centres in every sub-division, financed partly by the Government and partly by the district boards.

(iii) Yes.

(iv) I have no knowledge about the attendance at any such institution.

As regards the rest of the points raised in Question 2, I would suggest that a sufficient number of agricultural schools should be started in villages, with a large area of land to be utilised as school farms. Boys should be taught to experiment with different kinds of crops in those areas. Such institutions should be financed both by the Government and the district boards. There should be a committee of management on which members should be nominated by the members of the local boards or district boards among the members of that particular locality. Even non-members may be elected by local boards. I remember once that the Education Department asked the managing committee of a collegiate school of which I am the president as to the desirability of introducing agricultural education in high schools. My school has a big compound of about twelve acres of lands. We consented to introduce agriculture in our school provided Government helped us. But nothing was done by the Government after that.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) No such measures were ever adopted in Bihar to my knowledge.

(*b*) In my opinion there should be field demonstrations in important centres in every *thana* where all sorts of crops should be tried

and experimented with. Ways and means of manuring land should also be explained. Experiments in this direction should be made.

(c) Experts should often visit rural areas, deliver lectures on agriculture to cultivators, visit the fields of any particular cultivator at his request, examine the soil of that cultivator and then should point out how the bad element in that soil can be removed and the land made fertile. The expert should also explain to the cultivator the benefit that he can derive by sowing a particular crop for which the soil is congenial and which will be more profitable. Seed of profitable crops should be supplied on payment.

(*d*) I have no knowledge of any demonstration, but I have personal knowledge of propaganda that was made when I was made secretary of the agricultural association at Muzaffarpur with the Magistrate as president and an agricultural expert and leading agriculturists from rural areas as members. But that propaganda proved a failure. The reasons of the failure were many. Firstly, the Magistrate, who took a keen interest in agricultural welfare, was transferred and his successor took no interest in it and never consulted me or the association and never cared for it. Secondly, the agricultural expert was taken away from Muzaffarpur and nobody came in his place. Thirdly, the improved Pusa seeds proved a failure. The failure of the propaganda work is mostly due to the indifference of the Magistrate and the transfer of the agricultural expert. More time used to be given to law and order and the agricultural problem was neglected. Members of the association were never called to meet and thus the association died a natural death owing to the indifference and apathy of the Government and its officials. Village members are not in the least to blame for this failure; they always attended meetings at their own cost and heard the advice given in such meetings and in their locality they preached what they learned there. They introduced experiments in their own locality also. The failure of our propaganda was also due to the appearance of the non-co-operation movement started by Mahatma Gandhi. The tenant class thought that God had sent Mahatma Gandhi to them as their saviour and benefactor, so they listened more to his advice and that of his followers than ours. They believed that they would soon get *swaraj* and that their hard lot would much improve when *swaraj* came.

QUESTION 4.—ADMINISTRATION.—(*b*) In my opinion the Government should spend a large sum of money annually in improving agriculture. Agriculture is a provincial subject. I think a larger number of agricultural experts should be deputed to every district. I would suggest that there should be a well-equipped agricultural department at the head-quarters of every Provincial Government to control the work of the agricultural experts in districts and *thanas*. There should be no divisional agricultural association or body such as the Tirhut Agricultural Association, but there must be an agricultural officer in the headquarters of every district and a subordinate officer in each *thana*. The duties of these *thana* agricultural officers would be to visit the villages in their jurisdiction and to advise people regarding methods of improved agriculture.

(*c*) (i) I am not satisfied at present with the Agricultural and Veterinary services inasmuch as the cultivator class gets not the least benefit from them. These services need improvement and ought to be made serviceable to those for whom they are meant.

(ii) Railways and steamers are not at present helping the agriculturists in the prompt despatch of their agricultural produce to market. In our part of the Province the products to be sent to different markets are *lichis*, mangoes, chillies, tobacco, and in some parts

patwa. Of these, *lichis* and mangoes are perishable. Near about Pusa Road the chief source of income of most of the cultivators is from the sale of mangoes. The Pusa Road station is very busy in August and September and the latter part of July in despatching the mango produce of that locality to different parts. The railway should provide facilities for the prompt despatch of these perishable articles; otherwise there is a great loss. In short, the railway should provide a large number of wagons for carrying agricultural produce to different markets.

QUESTION 5.—FINANCE.—From the experience gained by me as secretary of the Central Co-operative Bank for some time and as its director for a long time, I am of opinion that the rate of interest charged to cultivators is excessive. It should not be more than twelve per cent per annum. In my opinion arrangements should be made by the Government and the Co-operative Bank to advance money to cultivators at a cheap rate of interest. The system of *taccavi* loans should be extended. This should be done through the agency of co-operative societies.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) Agriculture like any other kind of business, requires capital for such things as the purchase of bullocks, ploughs and other implements, seeds, fodder for cattle, wages of permanent and casual labourers, etc. Besides this, the maintenance of the members of the family of each cultivator also requires grain, salt, kerosene oil and clothing. They have to perform marriage, *upanayan*, and *sradh* ceremonies also. These are, in short, the main causes of borrowing.

(ii) The sources of credit of a cultivator are :

(1) his agricultural produce, (2) his lands if transferable by custom or law, (3) his cattle.

(iii) The reasons preventing repayment are failure of crops on account of flood, drought and animal pests. The productive capacity of the land also has much decreased.

(*b*) In my opinion the principles of the Usurious Loans Act should be strictly applied. But before the help of this Act is invoked the co-operative banks should be asked to reduce the present high rate of interest. As a member of the Bihar and Orissa Legislative Council in 1926, I impressed upon the Government the necessity of reducing the rate of interest, but the attitude of the Government was most unsympathetic.

(*c*) No. Rather, the right of transfer and mortgage should be conferred upon tenants in order to increase their sources of credit. The greater the sources of credit a tenant enjoys the cheaper the rate of interest that will be charged.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—I am strongly opposed to fragmentation of holdings. Such excessive sub-division of holdings renders cultivation difficult and almost unprofitable. I am of opinion that when there is a partition in any family provision must be made for allotting plot by plot to co-sharers as far as practicable and convenient. This is done when there is a partition suit in court, but out of court there is no remedy. The whole thing depends upon the desire of all the co-sharers. There are some obstinate and foolish co-sharers backed by evil-minded people who insist that there should be sub-division in each plot. At present if one goes to any village of cultivators one will find numerous sub-divisions of holdings: so much so that they have been rendered almost incapable of being ploughed. In my own case there was a plot of land measuring six decimals and that had to be divided into four

parts. My father got one-and-a-half decimals; we are three brothers and so we ought to get a half decimal each. But, in disgust, we have given up the entire one-and-a-half decimals. Similarly, there is another plot belonging to my family measuring two *bighas* and sixteen *kattas*. According to an old private partition made by our ancestors, in three parts, that plot has been split up into not less than twenty-five or twenty-six sub-plots and a one-third sharer has got his one-third share in eight or nine different places in the same survey plots. I have tried to convert it into three big blocks of sixteen *kattas* each so that each co-sharer may get one block of sixteen *kattas*. But on account of the obstinacy of some co-sharers I have been unable to do anything. The result is that the value of that land and the produce thereof has decreased at least fifty per cent. The chief obstacle in the way of consolidation is the absence of any provision in the law. In my opinion there should be legislation in this direction authorising the District Magistrate or Sub-Divisional Magistrate to order consolidation in this respect on an application being made to them by any party interested in such matters. Court fees should be levied cheaply on such applications, say, two annas to four annas per application. The Magistrates named above when approached to order consolidation of excessive sub-divisions or even exchange between different co-villagers or men of other villages owning such small fragments near about or on all sides of such lands, should at once take action in the matter; after hearing the parties, they should order consolidation or exchange immediately and register such consolidation and exchange in a record to be maintained which would have the force of a decree. Without legislation on the subject empowering the Magistrate in this behalf nothing can be done in this direction. Persuasion cannot succeed in such matters; legislation is absolutely necessary. I answer clause (*c*) in the affirmative. The object of legislation should be to authorise the Magistrate when approached to order such consolidation and exchange. But in a case where there are several tenants holding lands in one block, say two, three or four *kattas* each and I, for example, want to consolidate one big block for the improvement of agriculture or in order to build a house for agriculturists, on my application the Magistrate should call upon those neighbours of mine to accept lands from me in exchange for their lands, and, where that is impracticable, to accept the price thereof. Without such a measure no improvement can be effected. But these provisions should be for the benefit of village cultivators only and not for the purpose of bringing a large number of outside enterprising people like traders, *marwaris*, *banias* and capitalists to usurp all the lands the cultivators possess and make them landless and homeless. There should be a safeguard against these big enterprising people; otherwise these people will swallow up the land of several villages and make the villages deserted. The object should be to benefit the existing agriculturist class and not to benefit imported business men.

QUESTION 8.—IRRIGATION.—I advocate the adoption of irrigation schemes and safeguards against flood in North Bihar, including the districts of Muzaffarpur, Chapra, Motihari, Darbhanga, the northern parts of Monghyr and Bhagalpur and Purnea. I had tabled a resolution to be discussed in the Bihar and Orissa Legislative Council in the August session of 1926 but the resolution lapsed for want of time. Methods of irrigation may be as suggested in (i), (ii) and (iii) of the sub-questions according to the circumstances of a particular locality. The chief obstacles in this direction are the absence of any provision in law and the obstinacy of landlords in whose zamin-

daris lands require to be irrigated. I give one instance: some four years ago there was drought in my locality. By the grace of God the Baya river became full of water up to its highest level. People on both sides of the Baya river tried to irrigate their lands by taking water from that river. But some zamindars got their *zirat* lands irrigated but would not allow tenants to take water through their *zirat* lands. Consequently poor cultivators had to undertake a course of one mile for water to come to their lands and it took at least twenty days for three hundred *bighas* to be irrigated. Had the landlords allowed tenants to take water directly through their *zirat* lands they could have watered the lands in four or five days. But water could not stay for twenty days in Baya river and only about two-thirds of the low lands in one block could be watered before the water ran to the Ganges. There must also be provision in law for taking away excessive rain water which has accumulated in any *chaur* land in order to prevent paddy being washed away. Watering and taking away of excessive water from low lands are both equally necessary for the improvement of agriculture in our parts.

The chief obstacles are the absence of any law on the subject and the apathy of the Government and the district boards in this matter. In Champaran district there are one or two canals but none in the Muzaffarpur, Darbhanga and Saran districts. If Government really wants agricultural improvement for the benefit of poor people, then irrigational schemes and schemes for taking away excessive rain water should be at once taken in hand.

QUESTION 9.—SOILS.—(i) and (ii) In our part lands are of two descriptions, *viz.*, paddy lands and *bhith* lands. The paddy lands are again sub-divided into two parts, namely *chaur* lands, where paddy is sown in February and March, and high lands, where paddy is transplanted from July to August. The *chaur* lands are subject to flood, and in that case the excess of water requires to be taken away to prevent paddy being washed away. In high lands irrigation or watering is necessary in September and October on the failure of *hastu* rain. If the two methods mentioned above be adopted there will be a sufficient yield of paddy every year.

Bhith lands can be divided into several kinds. They fall under the heads of (1) *bangar* lands, (2) *pathkatail*, (3) sandy lands, (4) *balsumbhi* (partly *sumbhi* and partly sandy), (5) *sumbhi* lands. (6) *matiar*, (7) *katbhat* land and (8) alkali or *usar* lands. The last two kinds of lands are the worst lands; they are to be found to a large extent in my locality and they are a curse to the cultivators; they do not even give in return the cost of cultivation. In *usar* lands only *parwal* fruit can be transplanted, but that also requires a good manuring. The *katbhat* soil gives us a lot of trouble. If there is sufficient rain and the land remains under water for a long period it can produce something; but in some years even when there is sufficient water, the crops grow pale and fail. *Bangar* lands require the hardest labour in watering. If you water them sufficiently you will get a good harvest. They do not require any manure; their chief manure is water. If you go on watering the crops you get a good harvest. But there must be provision for watering such lands; if watered, this class of land will yield the best outturn but if not watered nothing will be produced. *Sumbhi*, *pathkatail* and *balsumbhi* require manuring. If properly manured they will produce crops, but their productive capacity has greatly decreased.

My suggestions under head (*a*) are:—

(i) Lands should be improved by drainage of surplus rain water from low paddy lands. The high paddy lands and *bangar* lands

should be watered and adequate provision should be made therefor. Other kinds of *bhith* lands require manuring.

(ii) Alkali (*usar*) lands and *katbhat* lands should be reclaimed. In this matter we greatly require expert advice. Our opinion is that the agricultural research hitherto carried on at Pusa at a tremendous cost has not been able to do anything in this matter. If Government can do anything in this direction we shall be much obliged. But then the Government will have to depute experts in this matter. Hitherto the village cultivators have been considering themselves much wiser and experienced than the products of Pusa Research Institute or the Sabour College in such matters; their idea is to have an *ail* on all sides of *usar* and *katbhat* lands at least one foot in height, store rain water therein, get them sufficiently flooded and that then you will get some *rabi* crop therein. The other method, which is more costly, is to remove the surface soil to the extent of one foot in depth and then convert them into good lands by storing water in them. This process is more beneficial but very costly.

(iii) In our part the flood water of some rivers which carry good silt has a fertilising power but in some rivers the water-carried sands have a deteriorating effect. For example, people welcome Bagmati water with alacrity but curse the water of the old Gandak flowing north of Muzaffarpur town. Measures to be adopted in this direction are the erection of *bunds*, but not in places near Bagmati river.

(*b*) I personally know of soils which have undergone marked improvement by Bagmati water and clay. Cultivators pray God to send Bagmati water and silt to their lands. But the silt yields many times more benefit to cultivators than mere watering. I have personally visited those localities. Cultivators of those localities are very happy and prosperous. But lands where a large quantity of sand is thrown down by the Gandak river (flowing north of Muzaffarpur) have suffered marked deterioration. This kind of land can be found in places north of Muzaffarpur town. The flood water of Saligrami Gandak which comes from Bettiah side and goes to Hajipur is very beneficial. The *bund* which runs from Bettiah to Hajipur, preventing the spread of Gandak (Saligrami) flood water to places in Sahebganj, Paroo, Lalganj and Hajipur *thanas* and other places in Champaran, has done more harm than good. When I made a motor tour on the *bund* in the jurisdiction of these *thanas* the people of these localities expressed their desire that the *bund* should be cut so as to allow river water to spread towards the east. The Bagmati *bund* which existed for a long time has been cut and the inhabitants of those localities have been greatly benefited. It would be much better if the Bihar Government were pleased to make enquiries into this matter and have the Saligrami *bund* from Bettiah to Hajipur cut.

(*c*) Government should depute experts to advise cultivators as to the reclamation of such lands. The Government should give some grant-in-aid also to such cultivators who are poor and require the assistance of Government in such matters. The Government may advance money also without interest, to be repaid within ten years by instalments.

QUESTION 10.—FERTILISERS.—(*a*) We generally make use of natural fertilisers, namely, cowdung and ashes of fuel as far as we can get those; they are very useful and profitable. But our real difficulties are want of fuel and pasture grounds to maintain a large number of cattle for our agricultural purposes. For want of pasture grounds and fodder the agriculturists have reduced their cattle by almost

as much as seventy-five per cent and now they only maintain bullocks for ploughing purposes. They have given up keeping she-buffaloes and cows with the result that there has been a general scarcity of milk required for the maintenance of our babies. There has been a scarcity of cowdung. There has also been a general scarcity of fuel owing to the fact that tenants are not allowed by their landlords to plant trees on their occupancy holdings. Formerly tenants used branches of *shisham* trees and bamboos as fuel, and some other dried up trees also supplied fuel; but this has been almost stopped. The present law on the subject, that so long as the trees stand on the tenants' cash-paying holdings the tenants are owners thereof, but the moment they are felled the trees belong to the landlord, has caused and is causing great hardship to the tenant class. In my opinion there must be sufficient pasture grounds in every village so that the agriculturists may maintain a large number of cattle and the tenants should be allowed the freedom of planting trees and appropriating the produce thereof and the timber when felled. This is a point of tenancy law which requires amendment. If these two measures are adopted we shall have a larger quantity of cowdung and fuel ashes for manuring purposes. We have not as yet tried artificial manures and therefore I am unable to express any definite opinion upon this point without further examining it.

(*b*) As we have not yet tried artificial manures, no question of adulteration arises.

(*c*) This can be done if the Government supplies experts in every sub-division to advise tenants on the desirability of using artificial fertilisers. The methods that I can suggest is that the Government should help the tenants in using this kind of fertiliser. For some time the Government should supply artificial fertilisers on credit and when the crops are ready payment can be made. You will have to create confidence in the ignorant peasantry. They have absolutely no confidence that the Government can do anything to improve the lot of the toiling peasants. If you once create confidence then they will themselves come and purchase artificial fertilisers. But then there must be stores in every sub-division. Co-operative banks may take up this question and supply artificial fertilisers.

(*d*) Everywhere cowdung and ashes are used. I do not know any place where artificial manures have been used.

(*f*) It would be much better and more profitable to save cowdung and use it as manure throughout the year. But there is the difficulty of fuel. The necessities of fuel must be met before one can think of manures. I personally feel very much about it and want to stop cowdung being used as fuel in my household but cannot help it for want of fuel. Cowdung fuel is generally used in the rainy season after being stored in a house in the month of May of every year. Nearly one-third of the cowdung per year is used in manuring and two-thirds as fuel. You cannot discourage its use as fuel unless you suggest provisions for other sources of fuel. In my opinion, the agriculturists should be encouraged to plant a larger number of *shisham* trees, bamboos and other trees without any hindrance by the landlords and should be allowed full use of them. This can be done by legislation. Then cowdung can be spared for manuring purposes. Let there be provision of pasture grounds in every village so that there may be a very large number of cattle in every village giving a larger quantity of cowdung for manure.

QUESTION 11.—CROPS.—(i) We generally grow paddy, *makai*, barley, wheat, *rahar* and some *sarson* also. For fodder purposes we grow

janera. We require good manuring for these crops. For paddy we require facilities for irrigation and taking away surplus rain water from low paddy lands.

(iii) Distribution of improved seeds can be done through the agency of the co-operative banks.

(iv) This is very important. In our part we have got a peculiar wild animal which looks like a horse. They are a constant nuisance to us; they destroy all sorts of crops, namely, *makai*, *rahar*, *mung*, wheat. We are tired of these animals. They visit one field, 20 or 25 in number at one time. It is no use manuring any land and sowing crops if they are to be devoured by this class of animal. If the Government can do something in this direction in driving away this kind of animal, they will earn the ever lasting gratitude of the peasantry.

(*b*) and (*c*). We are prepared to try any heavy yielding food crops if advised by an expert. But I have not tried any. Once I tried Pusa wheat and introduced the same in the Sadra sub-division of Muzaffarpur as the secretary of the agricultural association but the experiment proved a failure and the agriculturists gave it up in disgust. I tried *patwa* last year but I was put to loss. I could not get as much profit as paddy would give me. In my opinion the most profitable and cash-yielding crops are tobacco, chillies, *sarson*, *anda*, potatoes, ginger; but they require much manuring. Sugarcane also can bring in money but it requires much trouble and capital for crushing it and selling.

Among the food crops, improvements must be made in wheat, paddy, *makai*, barley and *rahar*. These are our every day staple food crops.

QUESTION 12.—CULTIVATION.—In my opinion, if power-ploughing machinery can be supplied on hire in every locality it would be much better. This can be done through the agency of the co-operative bank.

QUESTION 14.—IMPLEMENTS.—(*a*) and (*b*) We generally use country ploughs. We tried Meston ploughs, but the peasants are dissatisfied with them. Meston ploughs can only be used in making waste lands culturable; in culturable lands they have not done any good. The peasants are rather of opinion that they have done more harm than good. Hence now they are making free use of country ploughs. I myself keep both Meston and country ploughs, but more use is made of country ploughs. I have not as yet tried power ploughs.

(*c*) I have not as yet heard any complaint on this point.

QUESTION 15.—VETERINARY.—(*a*) It is all the same to us whether the Veterinary Department is under the Director of Agriculture or whether it is independent. What we really want is the benefit it can confer upon the agriculturists and their cattle.

(*b*) I do not think so, but I am not positive.

(ii) No.

(iii) It would be much better.

(*c*) (i) Not fully as yet because such dispensaries are few in number and mostly located in towns. My suggestion is that there must be a large number of such dispensaries in rural areas to meet the needs of the agriculturists. The peasants live in villages and not in towns; they cannot afford the luxuries of town life, much less for their cattle. I am of opinion that there should be one such dispensary in each *thana*.

(ii) I have not heard of any such touring dispensaries.

Babu Arikshan Sinha.

(*d*) No proper arrangements have as yet been made to deal with such contagious diseases. I would certainly like legislation on the subject. There was a private Bill on the subject for the consideration of the Bihar and Orissa Legislative Council, but it was withdrawn. I would welcome legislation on the same lines. The Bihar Government promised to introduce such a measure in the Legislative Council as a Government Bill, but no such Bill has as yet been introduced.

(*f*) To my knowledge no such preventive measure has been taken. The question of charging fees does not therefore arise.

(*g*) I consider further research to be desirable. In my opinion veterinary research is not quite complete or helpful to those for whom it is meant. But this should not be like another Pusa show where a huge amount of taxpayers' money is yearly spent without any corresponding benefit.

(i) I have no experience of Muktesar Institute.

(ii) I would advocate a provincial veterinary research institution.

(*h*) I would recommend such special investigations through research officers in the Province.

(*i*) I do not think it necessary; but I would advocate the appointment of such an officer with every Provincial Government. In my opinion such an officer will take prompt action when he is informed of the prevalence of any contagious animal disease. Such diseases are as great a course to the animal world as cholera and plague are to mankind.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) I am in favour of improving the breeds of cattle. I would make one suggestion that the district boards in each district should be asked to maintain a large number of *brahmani* bulls and he-buffaloes for breeding purposes and should allow their free use to the people of the rural areas without charging anything.

(*b*) (i) I have already suggested that on account of the decrease in the area of pasture grounds in every village there has been much decrease in the number of cattle, with the result that we have not got enough cowdung to manure our fields and we are getting only five *maunds* per *bigha* where we used to get twenty *maunds* per *bigha* some thirty years ago. I would recommend that Government should acquire at least twenty per cent of the land in every village at a cost to be borne half by the Provincial Government and half by the district boards, for pasture purposes.

(ii) There are such enclosed pastures only in paddy fields in our locality. They yield some grass but not in *bhith* lands.

(iii), (iv) and (v) In our part we get dry fodder from the wheat and barley straw. It is preserved in houses and is called *bhusa*. That is our best fodder. The second kind is the paddy straw, which lasts from November to June in the case of big agriculturists with a small number of cattle. The third kind of dry fodder is the stems of *makai*. This is the most inferior kind of fodder. We get green fodder when we sow *makai* crops and *janera*. This is in the month of July and August and partly in September. Some leaves of pulses such as *urid* and *mung* are also utilised as fodder. These make good fodder, but they are not much in quantity. There is a total absence of green fodder from March to June. In our part we get some *mung* as fodder in June but it only lasts for a week or so. We feel the greatest scarcity in the hot season. Sometimes there has been fodder famine in October and February.

(*c*) The last fifteen days of September and the whole of October after the rainy season is over. This is the first time after the agricultural year begins. The second period is the whole of February and fifteen days in March. The third period is from April to June. The young growing cattle will begin to thrive from July. March to June is the worst period for them.

(*d*) If improved methods of agriculture be adopted and we get a larger quantity of wheat, barley, paddy and pulses, they can supply our wants to a certain extent. No other suggestion appears to me feasible.

(*e*) I am not myself a landlord; I am only a cultivator, hence I cannot speak for landlords. Unless some statutory provision for pasture land is made I do not expect any keen interest from landlords.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) I would say two hundred days in a year. In the slack season he sits idle or looks after his cattle.

(*b*) Subsidiary industries will be of much help but I am not in a position to recommend any without fully examining this question.

(*c*) In our part some cultivators will adopt fruit growing. That is done by a caste called *Koiri*, who are expert cultivators and are very industrious people. Their chief occupation is agriculture. They know how to utilise every inch of land for the most profitable purposes. I have no knowledge of bee-keeping. Poultry rearing may be done by Mahommedans. Rope-making and basket-making are not very profitable.

(*d*) If Government can induce cultivators to grow cotton, spin it and weave as much cloth as is necessary for each family it will be doing a real benefit. The Government may establish such industries, but personally I am not convinced about it. If wheat straw is utilised for card-board, and rice straw for paper, there will be a further scarcity of fodder.

(*e*) It will give employment to labourers but it will be a real curse to cultivators as such industrial concerns will absorb all the agricultural labourers. But it may give some wages to the labouring classes. I must make one thing clear. Indian habits and manners are quite different from those prevailing in other countries. Here people are very conservative; they can work upon their own lands but they will not work in industrial concerns; only low class people such as wage-earners will go to such concerns. High class people will not; if they have no work of their own they will sit idle and starve but will not work as labourers. I am personally of opinion that high class people should appreciate the dignity of labour, at least on their own lands.

(*f*) I do not think much benefit can be derived from such methods; existing methods are in my opinion sufficient.

(*g*) Only industrial concerns can give people employment.

(*h*) They can form a village society to look after the sanitary condition of the village. This society can also be the medium for the supply of improved seeds and implements.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) (i) and (ii) This can be done by giving bigger wages. No other measures can be of any use. If you offer labourers much higher wages than they usually receive, they may go to places mentioned under (*a*) (i) and (ii), but I am not sure of it. It is not the increase of daily wages that will attract more labourers. Labour can be commanded in many ways. If you are a big zamindar you can command a large number of forced labourers

at very low wages. If you are a petty landlord you will command those labourers who cultivate lands in your *patti*, but you will have to pay them the ordinary wages, *i.e.*, four *seers* of grain *kutcha* weight, which is equal to half a *panseri*, per day. But if you are yourself a tenant and aspire to have some labourers you must advance money as loans to such labourers to meet their expenses in marriage and food in the slack season. Feed these labourers properly, pay them proper wages, make advances of money and grain to them, and then you can expect their services in the times of your need. If you cannot afford to advance money and grain to such labourers, you cannot expect their services when you require them at the time of transplantation of paddy seedlings and sowing of other crops. Even an increased rate of wages cannot bring you labourers, as these labourers are under the control of the three kinds of *zabardast* masters mentioned above. The last class of labourers are called *kamias* in Southern Bihar and *deblors* in North Bihar. These men will not be allowed to go to the fields of others even at an increased wage; if they want to earn more, they must fly to Bengal.

If you want permanent migration of labourers, you will have to give these people sufficient land, and money for building houses, and support them in times of necessity. Generally they will build their huts at the cost of their masters.

(*b*) There is really a shortage of agricultural labour in my Province. The causes are, firstly, the limited number of lower castes from which such labourers are drawn, and, secondly, the reasons I have mentioned in detail in answer to Question 18(*a*). In my humble opinion the remedy lies in getting a large number of labourers under one's own influence by giving them land, money and grain. The second remedy is that high class people should give up their conservative ideas and raise the dignity of manual labour. High class people should not grudge to work with their own hands on their own land. In that lies their salvation. I do not suggest that they should work as labourers in other people's fields, because that stage is very remote; but they should work on their own lands and feel no shame in it. The occupation of the agriculturist is more honourable than service. According to our Hindu ideas there are four ways of earning one's living: the first and foremost is agriculture, the second is trade, the third is service and the fourth and last is begging.

(*c*) I have no knowledge of surplus agricultural labour anywhere; I think there is shortage everywhere. But if you want to bring labourers temporarily into an area not at present under cultivation, then give them bigger wages either in money or grain; otherwise they will not come. Only increased pay and wages can take them there.

QUESTION 19.—FORESTS.—(*a*) No. Grazing facilities are not freely allowed. There are forest lands in Champaran district. As relations are strained between zamindars and tenants in that district, there is much interference by zamindars with regard to tenants grazing their cattle in such forests. Some civil cases have cropped up regarding the right of tenants to free grazing of their cattle in such forests. There are no forests in Muzaffarpur district. I am of opinion that tenants should be allowed the free right of grazing their cattle and the use of forest trees for fuel.

(*b*) By allowing free use of forests for grazing purposes and allowing firewood to be taken. This will not, of course, help in localities where there are no forests where my idea is that the cultivation of *rahar*, cotton and *andi* in greater areas will to a certain extent lessen the

scarcity of fuel. The growing of wheat and barley with improved seeds and good manuring can supply to some extent the need of fodder. *Janera* also when grown in larger quantities will meet part of the demand for fodder.

(*c*) I have no experience as to the first part of this question. As regards the second part, I would suggest the erection of *bunds* and arrangements for taking away surplus rain water from low lands by opening channels.

(*d*) I am unable to give a definite opinion upon this as I have not much experience of forest lands; but by increase of afforestation in villages there is a chance of greater numbers of wild animals assembling there and destroying the crops of villagers.

(*e*) I do not think there is any such opening.

(*f*) I do not think that forests are suffering deterioration by excessive grazing. I also do not think that soil erosion is being thereby facilitated.

QUESTION 20.—MARKETING.—So far as the village markets for the staple food crops and vegetables are concerned we have no complaints; we get enough customers and consumers. But so far as the more profitable cash-paying crops such as *patua*, tobacco, chillies, *andi* and ginger are concerned there are difficulties in village markets. These crops are not sold to any large extent in such markets; we require purchasers from outside. If such crops are produced near a railway station the producers are in a much more advantageous position. In some places mangoes and *lichi* fruits are produced. These fruits can advantageously be exported from places near railway stations, but at places distant from railway stations there are many difficulties.

(*d*) I would welcome such effective steps.

QUESTION 21.—TARIFFS AND SEA FREIGHTS.—Yes, I think so. I would recommend the reduction of custom duties and sea freights on agricultural produce.

QUESTION 22.—CO-OPERATION.—(*a*) In my opinion Government should devote more attention towards it by advancing a large sum of money. But I would say one thing: the rate of interest charged is high; it should not be more than twelve per cent per annum at the highest. I would recommend nine per cent per annum. I drew the attention of the Government to this need for reduction by interpellation in the Bihar and Orissa legislature in the Ranchi sessions of the Council in August 1926, but the reply of the Hon'ble Minister was most discouraging. Non-officials may likewise be encouraged to adopt this measure. I have myself been connected with the Muzaffarpur Co-operative Bank for a long time, have visited several societies, have acted as secretary for some time and as director for a long time. I am still a shareholder of the bank.

(*b*) (i), (ii) and (iii) Credit societies are working well, but there is no provision for teaching members the methods of improved agriculture and supplying improved seeds and manures. These people simply take loans and repay them; the bank only acts as their creditor and not as a useful instructor. In my opinion manures should be distributed through the agency of such societies. I have no knowledge of purchase societies nor of societies formed for sale of produce or stock. There are no such societies here.

(iv) There are no societies for effecting improvements, *e.g.*, the digging of wells and construction of *bunds*, walls and fences or the planting

of hedges. But I am strongly in favour of such societies; the Government should introduce them. I would increase the scope of these societies to make channels for taking away surplus rain water to prevent crops being washed away, and for supplying improved seeds and manures.

(v) There are no such societies here, but I strongly advocate their creation. Fragmented holdings are a curse; they should be aggregated and re-distributed in plots of reasonable size.

(vi) There are no such societies here, but they should exist and should deal with agricultural machinery such as power ploughs and plants and implements of various kinds.

(vii) and (viii) Societies for joint farming and cattle-breeding are not feasible or advisable; they will not succeed. Joint farming requires joint lands and joint lands are not available. I am not in favour of the types of societies mentioned under (vii) and (viii).

(*c*) I am strongly in favour of such legislation. Without it everything will fail. I have personal knowledge of one case; in my locality there is an area of *chaur* land of about 300 *bighas*. When rain water accumulates there and begins destroying the paddy it is very difficult to collect all the cultivators to make channels for taking away the surplus rain water. In such a case legislation is necessary.

(*d*) As I have already said, these societies are meant for advancing money and realising it. They never bother about agricultural improvement. I would suggest that extensive use should be made of such societies for improvement of the agricultural conditions in rural areas. I would suggest that the Agricultural Department should work in co-operation with the Co-operative Department. But I must still say that the Tirhut Agricultural Association is a huge fraud and has been doing nothing. If it means business it should consist of men connected with agriculture and not *darbaris*.

QUESTION 23.—GENERAL EDUCATION.—(*a*) I have been connected with a first grade college, and with high schools as a member of the governing body and as secretary and president, for the last twenty years. At present I am president of the managing committee of the Collegiate School, Muzaffarpur. In my opinion the present system of college education and high school education is good for nothing so far as agriculture and trade are concerned. Such education makes a man fit only for a clerkship, pleadership or some other service requiring literary knowledge such as that of deputy magistrate, *munsiff* or sub-registrar. Such educated people are worthless for agricultural purposes. They forget even the business of their families. In middle schools too the same condition prevails. Elementary schools, otherwise called primary schools, teach boys only how to read and write letters in the vernacular. Not much useful information is given to such boys. The teachers themselves do not know much of agriculture.

(*b*) (i) In primary and middle schools in rural areas I would suggest lessons in agriculture. There must be experimental farms attached to such rural schools.

(ii) There is no compulsory system of primary education in my locality or even in Bihar in rural areas. I advocate it.

(iii) The explanation is the want of the compulsory system.

QUESTION 24.—ATTRACTING CAPITAL.—(*a*) The steps necessary are the giving of facilities to such men for acquiring bigger areas of land. But there is a danger in it; if you allow capitalists from outside to have such facilities in rural areas, a large number of *marwaris* and other

people will flock to the rural areas, will devour all the poor cultivators and make them their labourers. Please improve the condition of those people who are real agriculturists by giving them aid, improved seeds and improved manures but do not import such capitalists into the villages. Please make provision for inducing big zamindars to settle their *bakast* lands with tenants. Why should they keep large tracts of *bakast* lands when millions are starving for want of land? They should take proper rents and settle the land with tenants. This will also solve the problem of forced labour.

(*b*) Want of capital, labour, skill, good seed, manure, facilities for irrigation and safety from flood.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) The Government has not spared the poor people from heavy taxation and has spent nothing for their benefit. The salt tax has been imposed upon poor people. Increase of postage rates and cost of postal registration and parcels have hit poor people very hard. The Government has increased court fees and registration charges for documents. From these sources Government is making a huge sum, but the Government is spending nothing for rural improvement. I would suggest that the Government should spend at least one crore of rupees in each major Province in the improvement of agriculture, rural conditions, health conditions, providing facilities for irrigation and opening channels for taking away surplus rain water. This one crore should be spent annually. Much money is spent by the Government in paying the salaries of high officials at the expense of poor cultivators; such salaries should be reduced.

(*b*) I am in favour of such economic surveys. In my opinion the scope of such enquiries should be as to what are the actual needs of such villagers, whether they require irrigational facilities and whether schemes should be initiated for taking away surplus rain water in order to prevent their crops being washed away? Do they require reclamation of alkali or *usar* lands and improved seeds and manures? How are they to be provided with these things? The enquiry should be made through the co-operative bank, the chairman of the district board, the chairman of the local board, the members of the district board of that locality and the members of union boards where such boards have been formed.

QUESTION 26.—STATISTICS.—I am not against extension and improvement of the existing statistical methods; in fact I would welcome it. But I must urge caution about one thing. It should not be done in such a way that the Government will show much expenditure under this head without doing any good to the actual cultivators in rural areas. If Government really wants to remove the difficulties and grievances of the poor cultivators, such periodical statistics may be prepared.

Conclusion.

As I have already said in the beginning, this Commission has not aroused much enthusiasm in the minds of the agriculturists who do not expect much benefit from it. A huge sum of poor-men's money will be spent on the cost of this Commission. If nothing comes of it or no substantial benefit accrues to the cultivating class, it will still further decrease the faith of the masses in Government's intention to benefit the agricultural population. The Government has done nothing up to this time to help the agricultural development of

India. Agriculture is the neglected child of the Government of India; neither the Government of India nor the Provincial Governments care in the least for the opinions of the representatives of the agricultural class in any place where such agricultural interests are discussed. The Government are very anxious concerning the industrial labour movement because that movement is befriended by the Labour Party in England, but nobody cares for the peasantry of India. I am prepared to throw down a challenge to the Government of India and the Provincial Government to show whether they have done as much for the Indian peasantry as they try to do for industrial labour. Have they ever nominated any member to the Legislative Assembly or the Provincial Council to represent the peasant class? Of course these places go to the zamindars and capitalists. But whatever the Government have done in the past, let them do something in the future. Let them set apart at least a crore of rupees in each major Province annually for agricultural improvement. Agriculturists care more for good harvests than for seats in the Councils or Assembly.

Oral Evidence.

66,800. *The Chairman*: Babu Arikshan Sinha, you are General Secretary of the Bihar Provincial Kisan Sabha?—Yes.

66,801. Are you here in your private capacity, or as secretary of that society?—The working committee decided not to send replies to the Questionnaire, but I consulted certain members of the committee, and submitted these replies on their advice.

66,802. Do I understand that you are here in your private capacity, and that you have not been sent by the society?—It may be taken that I am here in my private capacity.

66,803. You have not been sent by the society, and I do not propose to ask you any questions about the Bihar Provincial Kisan Sabha. I see from your answer to Question 1 (*a*), that it is your view that agriculturists have not been in the least benefited by research. Have you at any time visited the Imperial station at Pusa?—I have seen it twice or thrice.

66,804. Do you know anything about the work on sugarcane, and the acreage under improved sugarcane, the result of the working of the Pusa station?—I have not come across that.

66,805. Do you know anything about sugarcane cultivation at all?—Sugarcane is cultivated in my locality, but I cannot say whether or not the profit is the result of the improvement carried out at Pusa.

66,806. Is any rice grown in your locality?—Yes.

66,807. Is the variety called *dahia* cultivated there?—I have not heard the name *dahia*, but I think it is paddy which is grown in the low lands.

66,808. Do you know anything about the cultivation of groundnuts?—No.

66,809. Are you a practical farmer yourself?—Yes.

66,810. Have you ever guided a plough?—No, we cannot touch the plough.

66,811. Do you take interest in animal husbandry?—I have got some animals.

66,812. Can you yoke a pair of oxen?—No. The servants look after that.

66,813. Are you satisfied with the working of the local veterinary service?—I have happened to come across some veterinary hospitals.

66,814. Are there any veterinary dispensaries in the district?—There is no dispensary in the rural areas, and we experience great trouble in sending our cattle to the veterinary hospitals in the towns.

66,815. Have you ever visited a local veterinary dispensary?—I have not.

66,816. And yet you say that the cultivator has received no benefit at all from the Agricultural and Veterinary departments?—The fact is that the villagers, whenever their animals have been affected by disease, experience great difficulty in getting veterinary attention and they run here and there and no help can be given. The veterinary dispensaries do not give the same help as do the hospitals for men. If the veterinary hospitals could be conducted on similar lines they would be of use in the rural areas.

66,817. On page 267 of your note, you speak of Brahmani bulls. Are you thinking there of Brahmani bulls in the ordinary sense, or of premium bulls?—I am of opinion that a large number of Brahmani bulls should be maintained by the district boards. That is my idea.

66,818. Are the Brahmani bulls in your district good bulls? When a person dedicates a bull, does he choose the best and the most expensive bull for this purpose?—They are ordinary bulls. The fact is, they are not well protected. The Bill brought before the Legislative Council by Rai Bahadur Kharag Narain was a very useful measure but that has been dropped.

66,819. You are the secretary of an agricultural society. What is the type of bull that your members require?—In our parts country bulls are available. I have seen some bulls in Pusa but they are imported from other places.

66,820. *Sir Thomas Middleton*: You tell us that land has deteriorated in quality, that land which gave twenty *maunds* of produce in the past now gives only five *maunds*. Where are those lands?—Land has deteriorated everywhere.

66,821. Do you mean to say that the produce of Bihar and Orissa is now only one quarter of what it was thirty years ago?—I am not very exact as to the figure but the produce has come down many times. In our own lands the productive capacity has gone down. That is my actual experience.

66,822. You tell us that, so far, no department of the Government has done any good to cultivators but your conclusion is that the Government should spend a large amount of money in improving agriculture. How are you going to effect an improvement?—This can be done by propaganda, by supplying fertilisers and better seeds and so on. Then agriculture can be improved.

66,823. *Mr. Calvert*: During the last thirty years has the price of land gone up or gone down?—The price of land has gone up.

66,824. Are rents going up or going down?—They are going up.

66,825. You ascribe the failure of the agricultural association to the indifference of the Magistrate. Could not the association be run entirely on non-official lines?—I am not positive about it.

66,826. You still require the Magistrate to take interest?—Yes.

Babu Arikshan Sinha.

66,827. *Dr. Hyder*: What is your caste?—I am a Brahmin.

66,828. Brahmins do not cultivate the land?—Brahmins do cultivate the land. They only do not touch the plough.

66,829. Is it because the plough pollutes the Brahmin?—There is no question of polluting but a Brahmin would not touch the plough.

66,830. How many Brahmins are there in your district?—I have not got the figures. They are a large number.

66,831. Have you always been connected with the land?—Yes, that is my ancestral profession.

66,832. *Babu A. P. Varma*: You say that the Pusa wheat did not germinate in many places. Did you find out the reasons for that?—I cannot tell the reasons. It was supplied, through me, to many persons in my locality and they came to me and said that it did not germinate.

66,833. Did you not find out the reasons why it did not germinate?—I did not make any effort to enquire into the reasons; I saw the fields myself; the seed did not germinate.

66,834. On page 264 of your note, you say: "It would be much better if the Bihar Government were pleased to make inquiries into this matter and have the Saligrami *bund* from Bettiah to Hajipur cut." Do you know what would be the effect if these *bunds* are cut in heavy flood time?—In the Muzzaffarpur district I know there was a *bund* called Baghmati *bund* which was cut. Lands then became fertile and the people near that *bund* are very happy. When I went across this Hajipur *bund*, the people expressed the wish that the *bund* there should also be cut.

66,835. What the Commission would like to know is this: If these *bunds* are cut, what would be the effect on the neighbouring areas when heavy floods come?—My own idea is that the water will scatter away and not do any harm.

66,836. Do you know why these embankments were put up?—The idea was to prevent injury to some villages.

66,837. Do you not think that the injury that would be caused by your proposal would be greater than the gain got by irrigating a few extra acres?—That is a matter which I have not considered.

66,838. Can you say why that *bund* was put up at all?—I cannot say. Probably it was meant to protect the neighbouring villages from flood.

66,839 Would that purpose be served if these *bunds* were cut?—I think that if some sluices are made, it will serve the purpose. This year there has been a total absence of rain in the neighbouring villages and the cultivators had great difficulty in getting water for irrigating their lands.

66,840. On page 272 of your written statement you say: "Please make provision for inducing big zamindars to settle their *bakast* lands with tenants. Why should they keep large tracts of *bakast* lands when millions are starving for want of land?" To whom do you refer here? Do you mean the big zamindars, or the small zamindars, or do you mean the intermediaries?—I mean the big zamindars who have got many acres of land.

66,841. You want to leave the zamindars without any *zirat* land?—I do not say that they should be without any *zirat* land. They should keep only as much as was contemplated by the permanent settlement regulation, that is to say, as much as would be sufficient to maintain their families. There should be no addition to the *bakast* land.

66,842. You want the zamindars to be induced to settle their *bakast* lands. I want to know what the smaller landlords would do?—The smaller landlords could keep as much *zirat* land as they could cultivate, because there is no use keeping a very large tract of land when there are a large number of people who are without any lands at all. That is my point.

66,843. With regard to grazing grounds you say that twenty per cent of the land in every village should be acquired by the joint funds of the Government and the district boards. I ask you, what would be the fate of the ryots if twenty per cent of the lands were acquired and converted into grazing grounds?—If there were grazing grounds then the cultivators would keep a large number of cattle and thereby the fertility of the soil would be improved. Grazing grounds and forests are the two main essentials for the improvement of agriculture. If thirty *bighas* of pasture land be left in the villages then the number of cattle will be increased and we shall get a sufficient quantity of cowdung for manure, and the smaller quantity of land in the possession of the ryots would naturally produce a greater yield. So I say, both pasture land and forests are very essential for agriculture.

66,844. Would that not be achieved at the cost of the ryots? Whereas some would be benefited others would be put to a loss?—Of course, under the Land Acquisition proceedings they can be compensated for the loss of their land. The keeping of pasture land, however, will generally benefit the whole village, so that to achieve this benefit someone would naturally have to make some sacrifice.

66,845. You want nothing less than twenty per cent?—It may be less; I am quite prepared to accept a smaller percentage.

66,846. *Professor Gangulee*: Do you still practise at the Bar?—Yes.

66,847. You are the General Secretary of the Kisan Sabha?—Yes.

66,848. Do you draw any salary as General Secretary?—No.

66,849. Who is your President?—Babu Devaki Prasad Sinha.

66,850. Is he a member of the Legislative Council?—Yes.

66,851. What is the history of his election to the Council?—It is very difficult for me to give you the history of his election.

66,852. He was elected through your Kisan Sabha?—No, the Kisan Sabha did not get him elected. He was a candidate from the Palamau constituency and he succeeded in the ordinary course of the election.

66,853. Is your Kisan Sabha registered under a Government Act?—I do not think that any political body in Bihar is registered.

66,854. Is the Kisan Sabha then a political body?—To the same extent that the Muslim League and the Indian National Congress are political bodies.

66,855. *Mr. Kamat*: Have you visited Pusa yourself?—Yes.

66,856. Have you seen the work that is being done there?—Yes, I went round some places, but I did not see the institute during working hours.

66,857. How is it that you did not see the place during working hours?—Because I visited Pusa on Sundays; I went to Pusa three times.

66,858. So that you went each time during the week-end?—Yes.

66,859. How many members have you in your Kisan Sabha?—We have a large number of members.

66,860. Do they pay any subscription?—Yes, the subscription is four annas per head.

66,861. Do they pay their subscriptions regularly?—Some pay regularly, others do not.

66,862. Who collects the subscriptions?—I collect the subscriptions, in conjunction with some others.

66,863. *Sir Henry Lawrence*: I see from your note that, in your opinion, the remedy for agricultural distress is that the high class people should give up their conservative ideas and take to manual labour. You say that "high class people should not grudge to work with their own hands on their own lands."?—I think that they ought to do it. I think they should realise the dignity of labour.

66,864. What steps are you taking to press your gospel?—I cannot compel anybody, but there are people who are already doing it; they have begun to realise the position and are devoting their time to agriculture.

66,865. Are you practising this precept yourself?—I cannot do two things at one and the same time. I am a practising member of the Bar, but I do supervise my agricultural work. During the last vacation I supervised some fifty *bighas* of cultivation.

66,866. That is only supervision, but here you are advocating manual labour?—The English educated people will not go into the fields and work with their own hands. That is the difficulty and defect of the present system of English education.

(*The witness withdrew.*)

Mr. A. D. TUCKEY, I.C.S., Director of Land Records and Surveys, Bihar and Orissa.

Replies to the Questionnaire.

GENERAL.

1. It is not within the scope of the Commission's duties to make recommendations regarding the existing system of landownership and tenancy, but in my opinion this system is so intimately bound up with the existing system of agriculture and the problem of its improvement and development that it is at least essential for a proper understanding of the problem that something of the existing system of land ownership and tenancy should be grasped and I write this preliminary paragraph to attempt to explain briefly some of the more salient features of that system in Bihar and Orissa.

2. The tenancy law in this Province is particularly complicated because it is not uniform. There are three main tenancy Acts, the Bengal, Orissa and Chota Nagpur Tenancy Acts. The Bengal Tenancy Act is in force in Bihar, *i.e.*, in the Patna, Tirhut and Bhagalpur divisions except the district of the Santal Parganas, comprising the districts of Patna, Shahabad, Gaya, Saran, Champaran, Muzaffarpur, Darbhanga, Monghyr, Bhagalpur and Purnea.

The Chota Nagpur Tenancy Act is in force in the five districts of the Chota Nagpur division, Ranchi, Hazaribagh, Palamau, Manbhum and Singhbhum.

The Orissa Tenancy Act is in force in the three coast districts of the Orissa division, Balasore, Cuttack and Puri. Three districts remain, in each of which the tenancy law in force applies to that district only. In the Santal Parganas the two main laws are the Santal Parganas Settlement Regulation (Regulation III of 1872) and the Santal Parganas Rent Regulation (Regulation II of 1886); in Sambalpur the Central Provinces Land Revenue Act (Act XVIII of 1881) and the Central Provinces Tenancy Act (Act XII of 1898). Neither of these two Acts is any longer in force in the Central Provinces.

Angul, which is entirely a Government estate, is an exceptional district, under the Political Department of Government and the Political Agent for the Orissa Feudatory States. The law in force is the Angul Laws Regulation (Regulation III of 1913).

3. The land revenue is permanently settled in Bihar, and the proprietary interest has in many parts been minutely sub-divided into small estates. In Patna district in 1907 the average size of an estate was ninety-one acres and of a share in an estate ten acres. The Bengal Tenancy Act is doubtless well known by the Commission. Some of the more important questions in the districts in which it is in force are the transfer of occupancy rights, private lands of the proprietors, produce rents, and the possession of trees on ryot's holdings. The first three of these questions are intimately connected with the agricultural problem.

4. The transfer of an occupancy right is not valid against the landlord without his consent unless such a right exists by custom or usage. This right seldom can be proved, and there is a contest between the landlords, who wish to maintain control over transfers and obtain as much as they can in mutation fees, and the ryots, who wish to transfer freely and obtain the full value of the land transferred.

5. Proprietors' private lands are dealt with in chapter XI of the Act. The aim of the proprietors, and also of other landlords who are not proprietors, is that all the land of which they may be in direct possession or of which they obtain direct possession should be entirely under their control so that they may lease it at produce rents or high cash rents, and alter rents, and evict tenants without any of the control placed on these activities by the tenancy law. They do not cultivate or wish to cultivate the lands themselves in most cases, but they look to the lands to provide them with the food-grains which they require and with higher profits than can be obtained from ryoti lands, where the law imposes limitations in the interest of the ryots.

6. *Produce-rents.*—This problem is a most important one and affects the outturn from a large area of land. It may safely be said that most persons interested in land, whether landlords or ryots, who possess more land than they can cultivate themselves, wish to have some of the surplus cultivated for them on produce rent. By the general custom of the country, though it is against the law, no rights are conceded to those who cultivate on produce rent, except where the rent is a fixed quantity of produce, not varying with the crop, and in some areas where the proportion of land held on produce rent is so large that to deny occupancy rights in land held on produce rent would mean to deny them altogether.

In the district of Gaya sixty-six per cent of the land of settled and occupancy ryots was held on produce rent when the record-of-rights was prepared (1913—1918) and the settlement report of this district contains the most detailed statistical study of the question that has been made. The Settlement Officer's conclusions are that ten per cent of the land held on produce rent is left uncultivated against five-and-a-half per cent of cash-rented land; that the outturn of produce-rented land is at least ten per cent less than that of cash-rented land owing to indifferent husbandry; and that the proportion of produce-rented land bears no direct relation to that of irrigated land. The proportion of the land of settled and occupancy ryots held on produce rent in other districts of South Bihar are: Patna forty-four cent and Shahabad twenty-one per cent, South Monghyr thirty-two per cent, and South Bhagalpur sixteen per cent. Produce rents are not so prevalent in North Bihar, Chota Nagpur or Orissa but enough land is so held everywhere to make the question of importance.

Gaya Final Report, paragraph 155.

Gaya Final Report, paragraph 127.

Gaya Final Report, paragraph 141.

The problem of produce rents is connected with that of irrigation, as these rents are mainly prevalent in South Bihar, where the irrigated area is much greater than elsewhere in the Province. In reviewing the final settlement of South Monghyr the Director of Land Records wrote:—

"The produce-rent system in South Monghyr is, therefore, incompatible with the existence of the tenant right, and the exclusive possession of the facilities for irrigation which the landlords appear to possess is a weapon which ought not to be entrusted to their charge without safeguards. Where occupancy tenants pay away rents aggregating nearly three-fourths of the value of the crops, as appears to be frequently the case, occupancy rights are of no value, and the tenant himself has become merely the servant of the landlord."

7. In Chota Nagpur the people are largely aboriginals, and the Chota Nagpur Tenancy Act was framed to preserve these people from the cleverer Hindus. Some of the main differences from the Bihar Tenancy Act are:—

(1) The rent of an occupancy ryot cannot be enhanced except by an order of a revenue officer.

(2) A transfer by a ryot of his right in his holding or part thereof is forbidden except for short-term mortgages. This has recently been modified by allowing certain classes of transfer, not being transfer by an aboriginal ryot to a non-aboriginal transferee.

(3) The right of a ryot in a holding cannot be sold by any court except for its own arrears of rent, or for the recovery of a Government loan.

(4) Special rights of various classes such as village headmen, the founders of a village and their descendants and reclaimers of jungle and waste into rice land are recognised.

(5) Most of the litigation between landlord and tenant is cognisable by revenue courts and not by civil courts as in Bihar.

8. The transfer of ryoti rights is a problem in Chota Nagpur as much as in Bihar, the difficulties being that it is necessary to restrict transfer if the aboriginal ryots are to be maintained on the land which they have reclaimed from the jungle, yet the restrictions are evaded by surrender to the landlord and re-settlement by him and this enables

him to make his own terms in obtaining a large share of the purchase money. The ryot who has to sell obtains in consequence nothing like the full value for the land sold and has difficulty in obtaining credit. Rights in jungle and the preservation of forest, rights in lac, *begari* (forced labour) and, in North Hazaribagh and Palamau, as also in parts of Bihar, *kamiauti*, or agricultural labour under conditions which differ little from serfdom, are some of the important problems of Chota Nagpur. The land revenue is permanently settled.

9. In most of Orissa the land revenue is not permanently settled. In the temporarily-settled area, the estates are small, but the permanently-settled estates are large impartible estates. The Orissa Tenancy Act closely resembles the Bengal Tenancy Act in its main provisions. Three of the principal differences are noted below:—

(1) In the temporarily-settled estates provision has been made for the registration of transfers of occupancy holdings on payment of a fee of twenty-five per cent of the consideration money. Orissa Tenancy Act, Section 31.

(2) The limitation for a suit for arrears of rent of produce-rented land is one year instead of three, and rent in excess of half the gross produce of the land cannot be recovered. Orissa Tenancy Act, Section 78.

(3) The landlord has the right of distraint for the recovery of arrears of rent due for not more than a year. Orissa Tenancy Act, Chapter XIII.

10. In the district of the Santal Parganas the aim of the law is to preserve the Santal headman system, and a simple system of land tenure, in which the only parties are the proprietor and the cultivating ryot. Except for proprietors' private land, the village ryots have the right to all unsettled land in the village, and it cannot be settled with outsiders or retained by the landlord for his own cultivation. Transfer by a ryot is forbidden, and both the transferrer and transferee can be evicted and the land settled with another ryot. The office of headman is hereditary subject to fitness, but the district officer appoints and can dismiss the headman. Interest on debt cannot exceed the principal.

11. In Sambalpur the Central Provinces system is in force. In half the district (the *khalsa*), the landlords are *gaontias* who are proprietors of their home farms only and headmen for the ryoti land. The other half is zamindari. Land records are maintained by *patwaris* and each ryot has a receipt book in which the demand and payment of rent is entered by the *patwari*. In this district and in no other there are no disputes concerning the amount of rent payable and whether it has been paid or not. Transfer of ryoti land is illegal and is voidable by the landlords or by relations of the transfer, and presents much the same difficulties as in other parts of the Province, owing to the landlords' demands for fees.

12. The superior intelligence and education of those in power on the land is devoted in the main to obtaining, as rent, as much as possible of the profit accruing from the existing system of cultivation, and of keeping the cultivators in a state of dependence rather than to improving the outturn from the soil. An interesting example of this is the tremendous keenness of proprietors in partition cases to obtain within the estate allotted as many low caste and as few high caste tenants as possible. The failure to grant rent receipts, particularly for land held on produce rent, the exaction of illegal dues in addition to

the legal rent and cess, the denial of legal rights of occupancy in land held on produce rent and in unprivileged land which has been at some time in the direct possession of the landlord and has then been leased, are the main breaches of the tenancy law in common vogue among private landlords in the Province. Obtaining labour at less than the market rate from tenants and from debtors, binding debtors to work as serfs in payment of the interest on debts which they are never given the opportunity to repay, and the deliberate ruining of "refractory" tenants by means of litigation criminal and civil, often supported by forged documents and false evidence, are common and everyday practices also of those in power on the land, and it is hard for the actual cultivators of the soil to gain that security, freedom and economic independence which are so necessary for improvements in husbandry.

13. *Survey and Settlement.*—A survey on the scale of 16″ to the mile will have been completed, and a record-of-rights prepared for the whole Province, on the conclusion of the operations at present in progress in Orissa, with the exception of unstable *diara* areas along the banks of the larger Bihar rivers. Revision surveys and settlements have been made in two Bihar districts, in the temporarily-settled estates of Orissa and in Government estates in other parts. Settlement in this Province connotes the preparation of a record-of-rights, the decision of disputes incidental to this, and the settling of fair rents where this is applied for. As the revenue of most of the Province is permanently settled, it does not usually include revenue settlement.

QUESTION 5.—FINANCE.—(*a*) I enclose a note by an experienced Indian Settlement Officer:—

"*Finance.*—For the better financing of agricultural operations, co-operative agricultural societies' banks should be started by active propaganda in some of the picked important villages in each *thana*. If there be four co-operative banks in a *thana* covering an area of about 200 square miles, I think they can well serve as models for others to take up the movement and open new banks in course of time. Loans should be given by these banks only to agriculturists for the purchase of seeds, cattle and also for the subsistence of the ryot and his family but not for ceremonial purposes, *i.e.*, to be spent in any ceremony connected with marriages, births, deaths, etc. All these loans should be on short-term credit to be realised after the harvesting of the crop. Long-term credit should never be given to the cultivators as they are not capable of taking a long view of the thing and if long-term credit be given to them, the result will be to aggravate the evil. They will be found to spend all they have in their hands in a very short time and they will never think of making any saving and paying their debts in advance of the stipulated time, if possible. They have, it may be said, a tendency to remain always involved in debts. Only in years when the crops have failed and there is a general scarcity in the area, the outstanding debt for any year may be allowed to run for another year"

(*b*) I am very doubtful of the advantages of the *taccavi* grants to cultivators in ordinary times. The cultivators have to spend a lot in coming to court from villages and in going back, and also in making payments to petition-writers and other people who infest the court precincts, before they can get the amount applied for. A considerable part of the amount is thus lost for all good purposes and sometimes the amount borrowed is not actually spent for the purpose for which the loan was taken. Government has also to spend much in paying travelling allowances to officers who are deputed to make inquiries in

connection with these loans and also for the realisation of the loans. I may suggest, however, that these *taccavi* grants if allowed, should be made to cultivators through the medium of rural agricultural co-operative banks. This will be regarded as a State aid to the rural agricultural co-operative societies and will have the effect of stimulating the development of these societies in rural areas.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS —(*a*) (i) to (iii)—I give a note by the same officer :—

"I have no knowledge whether the Usurious Loans Act is enforced or what effect it has but it is certainly necessary for courts to have power to go behind the documents of a transaction and take an account.

(*a*) (i) (1) Improvident nature of the cultivators due to absence of education and lack of foresight.

(2) Social customs whereby, on occasions of births, deaths, marriages and some other events, they have to incur a heavy expenditure on ceremonies and feasts, much beyond their means. One such event not only absorbs all their savings but also leads them to incur fresh borrowings at an exorbitant rate of interest.

(3) Their dependence on agriculture, mainly, which in its turn depends on an uncertain rainfall. Excessive, deficient or untimely rainfall affects the crops adversely and cultivators, who have generally no savings to fall back on, are hard hit and the want of any subsidiary industry to which they can turn for their livelihood leads them to incur fresh debts for their subsistence or to turn out as labourers.

(4) Expenses incurred in fighting cases in law courts generally brought by some powerful landlord or neighbouring tenant or some moneylender intent on taking the land of the poorer ignorant tenants.

(ii) Land is the chief source of credit to the cultivators. Very few of them can raise any money without either selling or mortgaging their lands. The standing crops or the cattle of the cultivators also serve as their credit. Sometimes their willingness to serve as ploughmen or labourers for some prosperous cultivators also forms the source of credit.

(iii) (1) Lack of earnestness on the part of the cultivators to clear off the debts.

(2) Limited resources at their disposal.

(3) The cumulative effect of previous debts at an exorbitant rate of interest which is usually compounded in the rural areas.

(4) The unscrupulous nature of the creditors who go on advancing money or grain to the cultivators at an exorbitant rate of interest until the interest is enough to absorb the whole year's crops of the cultivators and make them perpetual debtors by starting the following year again with a borrowing. The cultivators are too weak to resist the temptation of borrowing, due to their lack of foresight and improvident nature."

(*b*) Special measures should be taken to enforce the application of the Usurious Loans Act in the rural areas and it should be made penal for anybody to lend money or grain on the security of any holding or prospective crops at a rate of interest beyond a specified limit, say twenty-five per cent. Measures should also be taken to encourage actively the development of rural co-operative banks which will provide facilities for borrowing to the cultivators in time of real need at a reasonable rate of interest, and will also discourage extravagance. It is quite possible that various subterfuges will be devised by the

creditors to avoid the penal clause by adding a part of the interest to the principal before advancing the actual sum borrowed to the debtor and showing the interest on paper at a low rate, but this is a contingency which cannot be avoided and must be left to the growth of a spirit of resistance to all illegal exactions on the part of the masses.

(c) The right of mortgage by a ryot is limited in Orissa by Section 96, which limits a usufructuary mortgage to a period of nine years, unless made with the express consent of his landlord. Sub-leasing by a ryot is similarly limited by Section 95.

Under the Chota Nagpur Tenancy Act, Section 46, transfer by sale or gift and by mortgages and leases for more than five years are invalid under Section 46, except that a *bhugut bandha* mortgage, which is a usufructuary mortgage whereby the loan and its interest are extinguished by the profits during the period of mortgage, may extend to seven years.

In Bihar the only restriction on sale is the necessity for the consent of the landlord, where the holding is not transferable by custom. I do not think that further restriction by legislation in Bihar would be practicable.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*b*) In this Province excessive sub-division of holdings is very marked and is still largely on the increase. Revision surveys and settlements in all cases disclose a large proportion of extra plots even in fully and densely cultivated areas, and the size of both the holding and the plot are steadily decreasing.

Discussed in paragraph 152 of Champaran Final Settlement Report 1913—1919 and paragraph 123, Gaya Final Settlement Report.

A warning must be given that settlement statistics do not provide figures of the number or area of holdings in the economic sense, where holding means the area cultivated by one family. The meaning of holding in settlement reports and statistics based on those reports, is the land of a separate tenancy, held in the same right under the same landlord. A holding in this settlement meaning bears no known relation to a holding in the economic meaning, and I do not think that figures for the latter could be obtained from settlement figures with any accuracy without elaborate statistics which would be difficult and expensive to compile. The division of the cultivated area by the census figures for the number of cultivators is the nearest method of ascertaining the size of holdings in this sense.

The unit by which the record-of-rights of the tenants is prepared is the village and, within the village, the landlord under whom the tenancy is held. The tenant may hold land—

(1) under different landlords;

(2) by different rights, *e.g.*, as a ryot at fixed rent, a ryot on a cash rent, a ryot on a produce rent, as under-ryot;

(3) in different villages;

(4) by the same right, under the same landlord and in the same village, but in different tenancies, *e.g.*, one may be an ancestral tenancy, one a fresh settlement of waste land from the landlord, and one a purchase of a holding or part holding of another man.

Each of these will be a separate settlement holding recorded separately. The ratio between this holding and a holding in the economic sense will vary according to the size of villages, the number of landlords, etc. The size of the plot or field, the unit of the survey and record, will also vary from the same reasons and according to the classification of fields adopted. In Bihar the fields are merely divided into two classes, rice-land and upland, but in the undulating country of Chota Nagpur there are usually six classes, three of rice-land and three of upland.

The obstacles in the way of consolidation are:—

(1) Lack of any interest in the question, and of any public opinion that there is a loss due to fragmentation.

(2) The laws of inheritance, and the constant traffic in part holdings.

(3) Restriction on alienation by custom and the tenancy law. This however works both ways and probably the more transfer there is under present conditions, the more holdings will be subdivided and scattered into plots at a distance from one another. In fact, if a village could be formed with all the holdings consolidated, it would become much like others within twenty years or so.

(4) Distrust between ryot and landlord, landlord and landlord, and ryot and ryot.

A vast amount of education in agricultural matters, and alteration in the whole outlook and point of view of the landholding and cultivating classes, would be necessary before much progress in consolidation could be made. Government have not made any attempt to encourage consolidation, and unless and until some serious attempt is made in Government estates, where there is only one landlord and transfers and exchanges could be allowed free without any transfer fee, and some success achieved there, it is premature to consider legislation to force it through in the average private estate where the landlord's interest is multitudinous and complicated. In large private estates under a single landlord, consolidation might be encouraged if the landlords would allow transfers and exchanges in this behalf free, but there is little reason to expect that either the cultivators would come to agreement, as they distrust each other, or that the landlords, or at any rate their underlings, would not attempt to make something out of it, and so defeat the probability of success.

(*c*) Legislation would be necessary to deal with alienation before consolidation could go far, but it is premature to consider this or what other legislation would be necessary, until there is some desire for consolidation, and some attempt has been made in that direction.

QUESTION 8.—IRRIGATION.—I append a statement* showing the proportion of net cropped area irrigated from different sources for the ten districts of Bihar, and four districts of Chota Nagpur, taken from settlement reports. In North Bihar the amount of irrigation is small. In Champaran although only 2·9 per cent is ordinarily irrigated from Government canals, 21 per cent is protected and irrigable from them. In South Bihar the irrigation both from private canals and from tanks and *ahars*, the main sources of irrigation, is in the hands of landlords, and the system of produce rents is prevalent (*vide* general note, paragraph 6). The main problem here is how to secure for the

* *Vide* page 289.

tenants security of tenure and freedom from a harassing system of high produce rents, while at the same time maintaining the efficiency of the irrigation systems. Government have devoted their attention to this, but no satisfactory solution has yet been found. A considerable amount of commutation of produce rents to cash has been effected at rates based on the assumption that the existing irrigation facilities will be maintained, but the commutation has been done in the teeth of the landlords' opposition. In the Settlement Report of Patna district the opinion is expressed that little progress in general prosperity among the ryots can be expected without general co-operation between landlords and tenants for commutation of produce rents on some reasonable basis. Such co-operation has not yet been achieved.

In the undulating country of Chota Nagpur (including the districts of Sambalpur and the Santal Parganas), large irrigation schemes are impracticable except in a few places, and the main sources of irrigation must be tanks and *ahars* (or *bunds*) formed by embanking across a slope above rice fields. There is much room for the increase of irrigation of this kind in Ranchi and Hazaribagh districts.

This kind of irrigation work is, in my opinion, best left in the hands of the cultivating ryots who should be encouraged in constructing them, by grant of the land for the irrigation work rent-free, and guarantee against enhancement of rent due to the improvement. In Manbhum district 95 per cent of these *bunds* have been constructed by the ryots, who in that district have been encouraged by the landlords and received generous terms. It is much the best irrigated district in Chota Nagpur.

The opinions of the settlement officers of Manbhum, Palamau and the Kodarma Government estate in Hazaribagh after experience of irrigation works constructed by Government in Government estates are that the ryots should be encouraged and helped to make their own irrigation works, rather than that the former policy should be continued of Government spending money on works intended to be remunerative.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) Probably not more than six months in the year when the crops of all three seasons, *bhadai, aghani* and *rabi* are cultivated, and less if only one or two crops are grown. In the slack season he works as a labourer if poor, but otherwise mainly idles. A small part of the time is spent in visiting relations and repairing his house.

(*c*) (1) The caste system among the Hindus and the idea among Indians as a whole that these industries are debasing and not fit to be taken up by the higher classes; (2) Absence of marketing organisation and communications, with the result that too much of the profit falls to the middleman.

(*d*) No. Probably better left to private enterprise.

(*e*) No.

QUESTION 18.—AGRICULTURAL LABOUR.—Except for seasonal shortage, I do not think that shortage of agricultural labour is acute. In the districts in which labour in general is most expensive and inefficient, apart from industrial centres, I believe the reason is the lack of energy among the people, which probably is due to a great extent to hookworm and other diseases. In certain parts of the Province, the problem is more that agricultural labour is that of serfs bound by debt. Paragraphs 265-276 of the Hazaribagh Settlement Report and para-

graphs 285-289 of the Palamau Settlement Report give a vivid and unpleasant description of the *kamiauti* system, *i.e.*, of men bound to labour for life for their masters as the result of a petty debt, which they can never repay as all they receive for their labour is a dole of grain, a cloth once a year and two or three *kathas* of land. The system is in practice hereditary and does not, in Palamau, where 60,000 such serfs were found, even provide regular employment for them, or payment during periods of unemployment.

Mr. Sifton has shown in paragraph 271 of the Hazaribagh report that the excuse put forward for this *kamiauti* system that cheap labour is necessary for the development of a backward district is without historical foundation and that it exists because the alien immigrants could conquer the country but could not work it.

QUESTION 24.—ATTRACTING CAPITAL.—(*b*) (1) Except for lands cultivated directly by the proprietors, of which the area is very small, the ownership of land does not belong to any one person, but is split up among those who have rights in it, from the proprietor through different grades of tenure-holders to the ryot or the under-ryot. Among the landlords some factors tending to discourage carrying out of improvements are:—

(1) Lack of education and of personal interest in agriculture and its improvement.—The management is too often left to underpaid and dishonest subordinate staff, and profits are more usually devoted to investment in interest in more land, if not absorbed in the keeping up or improvement of social position or in litigation.

(2) Division of interest.—Apart from the splitting up of interests by subdivision owing to the laws of inheritance, which is becoming more marked as the joint family system becomes less powerful, the traffic in land usually consists of buying and selling of undivided shares of a landlord's interest. When the landlord's interest is thus divided among numerous share-holders often on bad terms among themselves there is little likelihood of improvements being made and this cause has led often to the deterioration of irrigation works, where such are of large extent and involve the co-operation of an increasing number of interests.

(3) In parts of the Province the *thikadari* system, that is the system of leasing villages to temporary tenure holders, is against the possibility of improvements. The evils of this system are well described in paragraphs 202 *et seq.* of the Hazaribagh final report which I quote:—

"202. *Evils of the thikadari system.*—When the professional *thikadar*, the mere farmer of rents, is introduced into a village the healthy development of the village usually comes to an end, particularly if the system of short period *thikas* is favoured by the landlord. The *thikadar's* business is to make his profits as large as possible and he is not a philanthropist. From the landlord's point of view the *thikadari* system is a safe method by which he can squeeze the ryots indirectly without personally contravening the law. The *thikadar* on entering the village, requires first *salami* from all the ryots: he has paid usually at least one year's rent either as *salami* or as security, in order to obtain the *thika*, and it appears to him logical that he should at once make this good. Secondly, the landlord at each renewal or resettlement of a *thika* enhances the rent payable by the *thikadar*, who in turn logically enough passes the enhancement on to the ryots.

"Thirdly, the *thikadar* has to pay away practically the whole of the rent collected by him and is expected to make his profit out of the

manjhihas or *khas* lands. If there is no *manjhihas* he annexes some of the best lands and makes a redistribution of the rest of the village among the ryots. If there is *manjhihas*, he is not content but tries to increase the area. How heavily the constantly increasing drain weighs upon the ryots can be easily imagined.

"203. *Combination of thikadari with mahajani.*—Another source of profit to the *thikadar* is the opportunity it gives him for *mahajani* business. When the same man combines the positions of moneylender and landlord to the village, his immediate profits are great, and in addition he soon has the ryots so involved they are unable to offer any adequate resistance to his oppressive measures. It is for the sake of the *mahajani* profits that the principal *Marwari* grain merchants of Hazaribagh town hold very extensive *thikadari* interests in the Padma Estate.

"204. *Thikadar's abwabs.*—Besides raising the rent the *thikadar* introduces *abwabs*. He willingly pays *abwabs* to the landlord, because it gives him a logical excuse for imposing them with additions upon the ryots. The *thikadar* must get his *manjhihas* lands cultivated, so he introduces *begari*. Altogether it is hardly possible to exaggerate the mischief caused by this system to the ryoti life in the district."

It is most used and does most harm in areas where there is room for further improvement. It is not so prevalent in Bihar and hardly exists in Orissa.

(4) The restrictions imposed by tenancy legislation. In theory this factor should be an important one, and may be stressed in evidence, as the tenancy law, though very necessary for the protection of the ryots, must hinder lawful activity on the part of the landlord. In practice it has not had much effect, to judge from the condition of those estates and areas where the landlord has been strong enough to override and disregard the tenancy law.

Among tenants I would instance insecurity of tenure, failure of landlords to grant rent receipts, produce rent, *abwab* or unlawful demands by landlords, as well as ignorance and poverty. The main aim of the tenant who prospers is to become a landlord. This is due partly to a desire to obtain security of tenure, partly to the difficulties in the older and fully developed parts of either extending cultivation or buying land, and partly to use the power so gained as he has seen landlords use it, in order to get cheaper labour than can be obtained in the open market, and to get a large share of the profits won by the labour of others. The title of one who buys is seldom safe from attack in the courts, so expansion is of the nature of a gamble, with litigation as the cards.

Similarly, improvements may too easily be made the subject of litigation. If the tenant builds a new house or a tank without permission of the landlord, he is not safe, and permission usually means payment of a premium, and often further payments to underlings. The largest landlord in the Province has in recent years, in at least part of his estates, insisted before he gave permission for a ryot to excavate on his holding a tank to provide drinking water for men and cattle, on a petition being filed that it was being made merely as an act of piety, claimed that the tank should be recorded as in his own waste land, although a *salami* (premium) was also paid for the permission.

QUESTION 26.—STATISTICS.—The only accurate collection of most of the agricultural statistics is made during survey and settlement operations. The original survey and settlement of the Province is com-

plete, and fairly accurate basic figures for areas under cultivation and crops, livestock and ploughs have been obtained. Satisfactory information on land tenure has been obtained at the same time but, as pointed out in the answer to Question 7, the settlement statistics do not give accurate information of the size of holdings. To provide this the *khatians* of all ryots or joint families would have to be brought together in a statement for each village, and compiled also for larger areas to eliminate the duplication of men cultivating in more than one village. The task would be a difficult one and would not be cheap, and its cost could hardly in fairness be added to the costs of the settlement which are borne by the landlords and ryots.

Settlement operations cause a good deal of harassment to the people and are not popular, and there is no certainty that the present policy of Government of revising settlements every twenty-five to thirty years will be continued. In some districts revision is already overdue. Unless revision settlements are continued, the agricultural statistics will get gradually worse, as there is no maintenance of records in this Province and the methods by which the annual estimates of areas under cultivation and crops are made are not accurate.

In this Province, where there is not the subordinate revenue staff through whom the statistics can be compiled, where the people are not sufficiently educated to be either able or willing to supply figures themselves, and where local units of area vary from district to district and from pargana to pargana, if they exist at all—in parts of the Province the only unit is still that on which a vague measure of seed is sown, or which produces so many equally vague measures of grain—the collection of accurate agricultural statistics would be a very expensive work, and it is for consideration to what extent such money would be spent to the best advantage until agricultural education has progressed further.

Mr. Hubback, my predecessor as Director of Land Records and Surveys, has evolved a scheme for random sampling to estimate the yield of rice, the most important crop in the Province, but it is beyond my mathematical ability to form an opinion on it. Obtaining more accurate estimate of crop yields is again a matter of cost. The most extensive crop cutting experiments that have been made are probably those made by the Settlement Department, as an aid to fair rent settlement in different districts, and a good many experiments are made by revenue officers in commuting produce rents under the Tenancy Acts, but I do not know to what extent these are used by the Agricultural Department, or what work that department does in this direction.

I am inclined to think that there could, with advantage, be closer touch between the Department of Agriculture and that of Land Records, in the matter of statistics. I have no knowledge of the lines on which the Agricultural Department are working or whether they could obtain more help from our figures than they do, either by obtaining them earlier or by further arrangements in these departments, or by collection of material during settlements. When the settlement of a district is in progress there are facilities which are available at no other time, of obtaining material, as the staff, in the preparation of the maps and the record-of-rights, cover the whole district during the course of the settlement.

Percentage of cropped area irrigated.

District.	Government canals.	Private canals.	Tanks and *ahars.*	Wells.	Other sources.	Total.
1	2	3	4	5	6	7
SOUTH BIHAR.						
Gaya	4·3	16	26·8	6	1·7	54·8
Patna	2·2	21·6	24·3	6·7	4·8	59·6
South Bhagalpur ..	..	16·5	5·5	1·2	12·8	36
South Monghyr	..	7	20	3	12	42
Shahabad	22·3	3·8	10·3	4·8	·7	41·9
NORTH BIHAR.						
Muzaffarpur	..	·06	·24	1·2	·41	1·9
Saran	..	1·8	4·2	12·2	1	19·2
Champaran	2·9*	3·7	·3	·1	1	8
Darbhanga	..	·2	2·8	·4	3·1	6·5
North Monghyr	..	..	·3	·2	2·1	2·6
North Bhagalpur ..	..	..	·5	·2	3·8	4·5
Purnea	..	..	..	..	..	1·5
CHOTA NAGPUR						
Ranchi	..	..	..	..	..	·14
Hazaribagh	..	..	..	..	..	1
Palamau	..	..	9·1	·7	·2	10
Manbhum	..	..	15	..	..	15

* But 21 per cent is protected and irrigable from the Government canals.

Oral Evidence.

66,867. *The Chairman*: Mr. Tuckey, you are Director of Land Records and Survey, Bihar and Orissa?—Yes.

66,868. Would you enlarge a little on the effect of the permanent settlement upon agricultural development? First of all as regards private irrigation schemes, is it your view that the permanent settlement touches, at all, the question of irrigation by private persons?—I do not think it is possible to say what would be the effect in Bihar if the settlement had been temporary. I have not got the data to give an opinion on that point. All I can say is that in Orissa where you have partly temporarily settled estates and partly permanently settled estates, I have not noticed very much difference.

66,869. As regards irrigation by Government, do you think that the permanent settlement is a bar to the extension of such irrigation?—No; I do not see why it should be.

66,870. You see no reason why Government should not make a proper charge for the water and so recoup itself for the expenses involved from year to year in providing the water?—There are two big irrigation schemes in the Province, one of which is in the permanently settled estates and the other in the temporarily settled estates, and I do not think that either of these schemes shows that there is much difference.

66,871. Could you tell us a little more about the objection the zamindars have to the development of the lands by tenants themselves? Have you noticed that tendency?—I do not know exactly what you mean by objection. There is objection to anyhing which would make the tenant more independent.

66,872. You have not noticed any deliberate discouraging by the zamindar of any attempt by tenants to improve agricultural conditions?—The discouragement to the tenant to improve is due to his insecurity from the zamindar largely, in which position the zamindar wants to keep him.

66,873. *Professor Gangulee*: Could you develop that a little? What is the nature of that insecurity?—The zamindars do not usually grant rent-receipts, and if they grant them they do not grant them in the proper form, and if a tenant can at any time be sued for three years' rent, although he has paid it, and the zamindar in nine cases out of ten can get a decree for it, well, the tenant is not going to make improvements.

66,874. *The Raja of Parlakimedi*: He can insist upon a proper receipt?—In theory yes, but not in practice.

66,875. He can sue the zamindar in a court of law?—In theory, but not in practice; he has not got the power.

66,876. *Dr. Hyder*: Do they send money to the landlords through the post office in the form of money orders?—Not very much, I believe. I do not know very much about that; it is usually refused, I think.

66,877. *The Chairman*: In your answer to Question No. 5 (*a*), you quote a note by an experienced Indian Settlement Officer, and that officer takes the view that "long term credit should never be given to the cultivators as they are not capable of taking a long view of the thing, and if long-term credit be given to them the result will be to aggravate the evil." Do you share that view?—No.

66,878. For land improvement and for debt redemption they must have long-term money?—I should think so.

66,879. *Mr. Calvert*: A distinction is made there between agriculturists and cultivators. "Loans should be given by these banks only to agriculturists for the purchase of seeds...Long term credit should never be given to the cultivators." What exactly is the distinction made there?—I do not think that any distinction is intended there.

66,880. He means tenants, not peasant proprietors?—I think that is what is meant there.

66,881. *The Chairman*: Is it your view that there is an opening for minor irrigation schemes in this Province?—In the Ranchi and Hazaribagh districts of Chota Nagpur, there certainly is.

66,882. What system of tenancy obtains where these opportunities exist? Is it a permanently settled area?—Yes.

66,883. But will it be possible, do you think, to get the cultivators to come together for schemes of that sort?—In time it will be, I think. It depends on the extent to which they are encouraged by their landlords.

66,884. Will the landlords take a hand? The landlords will have to agree to the scheme before it can become effective?—It is a question of getting the landlords to give easy terms; that is particularly the case in country which is still being developed.

66,885. Would you like to see a special officer appointed to give technical advice as to minor irrigation schemes?—Technical advice would not be much use without propaganda. You ought to have a desire, and people applying for technical advice; I do not quite know how much demand there would be.

66,886. If there were available an officer who had been happily chosen for the work, he might do propaganda as well as give technical advice?—I should think it would be worth while.

66,887. If one and the same officer is responsible for larger irrigation schemes and also for the extension of minor irrigation schemes, it is almost inevitable that his attention should be devoted to existing important schemes?—They would not come in the same areas at all. These minor irrigation schemes are wanted in places where major irrigation schemes are impossible.

66,888. Meantime, the Irrigation Department is technically responsible for irrigation in this Province, but there is no officer concerned to push on minor irrigation schemes?—I suppose that is the position.

66,889. In answer to Question No. 24 (*b*), you give some of the effects which, in your opinion, flow from the existing system of tenancy, and in the last paragraph you describe a case in which the largest landlord in the Province insisted before he gave permission to a ryot to excavate, on his holding a tank to provide drinking water for men and cattle, on a petition being filed that it was being made merely as an act of piety, that the tank should be recorded as in his own waste land, although a *salami* (premium) was also paid for the permission. Is public opinion at all effective in controlling a situation of that sort?—No.

66,890. Have you noticed any increase in the general interest in agricultural matters, as a result of the discussions in the legislature, since the Reforms?—I do not suppose that it has filtered down to the districts yet.

66,891. Is it in evidence at the top? Have you noticed any increased interest being taken in agricultural matters by what is called the intelligentsia?—You have theoretical interest, at least. In the matter of grazing grounds, I may quote the case of the same zamindar whom I

have instanced. There was a large area which had been a river bed, and the ryots put in a petition that it should be kept as a grazing ground. It was being used as a grazing ground. The Director of Land Records wrote a letter to the landlord asking if he might have permission to record that this land should not be broken up for cultivation but should be kept as a grazing reserve for thirty years, as he thought that possibly the strong Hindu public opinion on this point might have influence with this landlord. The letter was never answered.

66,892. *The Raja of Parlakimedi*: To come back to the issue of receipts by the zamindars, is your remark in relation to certain particular areas?—No. There are exceptions in certain areas, but it is very general in a great part of the Province.

66,893. Are you prepared to say that the zamindars of this Province are powerful enough to go round the public offices and courts and influence them to such an extent that the ryots do not get proper justice?—It is not a question of going round to the courts and influencing them. It is largely a question of the power of the purse. The ryots have not got the money to fight the zamindar up to all the various appeal courts, unless they can combine, which, as a rule, they cannot. In some few cases they do combine, and then the zamindar is in a very unhappy position.

66,894. Has the fact that proper receipts are not given to the ryots by the zamindars been brought to your notice?—Yes, in hundreds and hundreds of instances.

66,895. What notice did you take of them?—In the course of a settlement the usual procedure is to select some of the worst instances and send them up, under Section 58 of the Bengal Tenancy Act or equivalent sections of the other Acts, to the district authorities. But the results have been very disappointing, as noted in many settlement reports.

66,896. *Sir James MacKenna*: Have you any indication that the co-operative movement is having any effect on the amelioration of the condition of the tenants, or in strengthening their position against the zamindars?—It has never come to my notice in my settlement work. But I have never had anything to do with the co-operative work directly.

66,897. You did not get that impression as a settlement officer?—It has never come up prominently to notice. There were never any particular enquiries directed to that point.

66,898. Would you say that, in a considerable part of this Province, the relations existing between zamindars and tenants are a serious obstacle to agricultural improvement?—Yes, I should.

66,899. *Professor Gangulee*: By the series of settlements and cadastral surveys that you undertake, you prepare records-of-right Is there any means, in the permanently settled areas, of keeping these records up to date?—No. The only district in the Province in which the record is kept up to date is Sambalpur, in which the Central Provinces system of maintenance is more or less kept up. It was tried in the temporarily settled areas in Orissa, under the orders of the Government of India, but it was a failure.

66,900. Why was it a failure?—That is hard to say. I think it was a failure because there was no suitable agency for doing the work of maintenance.

66,901. Do you consider that, in the permanently settled areas, the keeping of the records-of-right up to date is rather more difficult than in the temporary settled areas. or in the ryotwari tracts?—There are no ryotwari tracts except Government estates.

66,902. Let us compare as between the permanent settled areas and the temporary settled areas?—I do not think that such maintenance is a practical proposition in this Province in either area. It is a question of maintaining by revision settlements at intervals, when the previous records have gone out of date.

66,903. As a result of these records-of-right, do you find that litigation is decreasing, or is it increasing?—Litigation increases at the actual time of the preparation, or immediately afterwards, naturally, because a lot of cases are raised by the settlement, but after that it certainly decreases. What you do find is that in places where there have been a number of revisions of records-of-right which have been revised two or three times, there is enormously more respect paid to them, and it narrows the point of litigation very much; both sides appeal to the record, but it requires two, and probably three revisions of records to get to that stage. The parties, because of their experience, have learnt to understand it and to abide by it.

66,904. We understand that the Chota Nagpur Tenancy Act, in its sections prohibiting the sale, mortgage, or transfer of holdings by tenants, has been a failure?—Not entirely. But it has some very obvious defects.

66,905. You would not consider it an entire failure?—It is not an entire success, neither is it an entire failure.

66,906. Could you express an opinion on the Usurious Loans Act? In answer to Question 6 (*b*), you recommend the adoption of certain special measures?—That was not my suggestion. I think the ryots have no knowledge of this Act. As far as I know, it is a fairly new Act, and I do not think it has been tried out long enough to see whether it is ineffective.

66,907. The suggestion there is from another officer?—Yes. The only place where I know it has been really effective is the Santal Parganas, where they have a law that the interest cannot exceed the principal.

66,908. That is the law of *damdopat*?—Yes, it is in force in the Santal Parganas.

66,909. In answer to Question 7 (*b*), you discuss the question of the excessive subdivision of holdings which, you say, is very marked and is still largely on the increase. Do you think the time has come for any legislative measures?—As I have said there, I do not think the time has come for legislative measures until the thing has been tried out in the best possible conditions, which would be in a Government estate or any estate where the tenants, the actual cultivators, hold directly from the proprietor. Where you have an enormous number of varying and clashing interests of tenure, proprietors, tenure-holders, ryots and under-ryots, it would be extraordinarily difficult to do anything, at any rate till the idea became commonly known and appreciated by the people, until it aroused public opinion in favour of it.

66,910. Do you think that co-operative societies can be of any assistance in that direction?—I could not say.

66,911. Are you familiar with the success which the Punjab has had in the matter of consolidation of holdings?—No. I saw some reference to it in reading some of the evidence. I have never seen it myself.

66,912. Has any attempt in that direction been made in the Government estates here?—None, so far as I know.

66,913. Or in the Court of Wards estates?—Not as far as I know.

66,914. In collecting agricultural statistics, do you follow Mr. Hubback's method now?—It is not being used at the moment.

66,915. You say that in this matter the departments of Agriculture and Land Records should be in closer touch. What is the present position?—As I say, I do not really know whether they should be in closer touch. It has always been a matter of surprise to me that more use was not made of the chance of a settlement by the Agricultural Department. I cannot say whether it could have given them anything, but it is surprising that it was not asked for. That is all I can say.

66,916. Do you think that by a closer co-operation between the two departments, the agricultural statistics of the Province could be a little improved?—The only thing there is against that view is that my predecessor as Director of Land Records and the present Director of Agriculture were very great personal friends, and I think if Mr. Dobbs had wanted any further statistics he would have asked for them: it might perhaps be presumed that he did not want anything more. Mr. Dobbs and Mr. Hubback were in constant touch over the crop-cutting experiments and other things.

66,917. From the various quotations you have given in your note of evidence, I see that you refer to different kinds of *abwab*. How many kinds of *abwab* have the ryots to pay?—They may vary in different parts. One could not make any general answer to that question.

66,918. Could you give the Commission any idea as to how many different kinds of *abwabs* there are?—There are fifty to a hundred *abwabs*, but they are not all paid by any one ryot. They vary tremendously in different parts. In one place you may have none, but in another place there may be quite a number.

66,919. *Mr. Kamat*: There are various Tenancy Acts in force in this Province. Would it be possible, as a matter of simplification, to reform this complicated system and to have one consolidated Act defining the relations between the landlords and the tenants?—I do not think so. You would have to put in all the provisions of the different Acts. It would not simplify matters.

66,920. With reference to the terms of the permanent settlement, is it a fact that there has been a proclamation on record that even the rents also should be permanently fixed?—I do not know. I know that there are a number of officers who have studied the question who think that that was the intention, but I do not know whether there was a definite proclamation to that effect.

66,921. *Mr. Danby*: Do you consider that, under the present system of land ownership, it is not possible to obtain any improvement in agriculture in the Province?—No, but I think it is a serious handicap.

66,922. Do you think that the relations between the landlords and the tenants are unsatisfactory?—On the whole, yes. Again it is very difficult to generalise.

66,923. The conditions in the north of the Province are very different from those in the south?—They differ much more than that. The conditions in different districts are absolutely different. North Bihar is quite different from South Bihar. South Bihar is entirely different from Chota Nagpur, and Orissa is again entirely different.

66,924. *Sir Thomas Middleton*: In this Province the Director of Agriculture is directly responsible for the submission of agricultural statistics to the Government of India?—I thought the Government was.

66,925. Who compiles the statistics and sends them to the Government of India?—I think the Local Government does but I am not sure.

66,926. In the United Provinces and the Punjab, it is the Director of Land Records who is responsible for compiling and forwarding them.

I wanted to ask you whether there was any advantage, in this Province, in passing the statistics through the Department of Agriculture?—This Province has not the advantages of these other Provinces because there is no subordinate revenue agency. It does not exist except in one district in this Province.

66,927. You have explained clearly the difficulties there are in collecting statistics. It is quite obvious that things are bad, and one wonders whether it might not be an advantage if one department only were made responsible for their preparation and submission to the Government of India. I do not see what improvement the Agricultural Department can effect on the figures which they collect from you?—I am afraid that is a point on which I cannot give an opinion. I do not know what work the Agricultural Department does in this matter.

66,928. Apparently they merely collect figures and forward them. The only reliable source of figures is your settlement work?—I think the Agricultural Department did some special work in collecting accurate figures for jute.

66,929. That was a special inquiry?—The idea was to get the jute forecast more accurate.

66,930. This inquiry affected only a very limited area of the Province but if you take the major crops, such as rice, etcetera, there is no basis except the figures that you arrive at when carrying out your settlements?—No.

66,931. With reference to this question whether private canals have increased or decreased in Bihar and Orissa, the figures published by the Government of India seem to indicate that there is a small increase in irrigation from private canals. It has risen from about 904,000 acres in 1920-21 to 910,000 acres in 1924-25. I cannot say whether these figures have any significance at all?—I do not know what these figures are based upon and I cannot imagine how they were collected.

66,932. The figures given for 1920-21 are 904,335 acres in one year. One would suppose that this exact figure was based on pretty careful investigation?—A new district might have come under settlement and revised figures might have been obtained for it, and that might have shown an increase.

66,933. There is no means in the Province of ascertaining what the changes are from year to year, except by adding the figures got from the newly settled districts?—We do get reports from the village *chaukidars* on which the higher officers make their guesses.

66,934. The areas under crops in different districts vary largely from year to year and the units used in measuring land also vary from district to district. Do you think the *chaukidar* has enough knowledge of units of area to get accurate figures as to areas?—Probably most of the *chaukidars* do not know what an acre means. They probably have a general idea that there were so many more *bighas* under this crop or that. They could show the general increase, I think.

66,935. Can you make any suggestion for the improvement of these area figures which are submitted to the Government of India? Can you see any means, apart from an entire change in the revenue system?—I cannot.

66,936. Since accuracy depends upon settlement operations, if the settlements were made at longer intervals as has been suggested, the tendency would be for the figures to get worse and worse?—Yes.

66,937. *Mr. Calvert*: On page 283 of your note you make a reference to the restrictions on alienation by way of sale and mortgage. Do these

restrictions serve to reduce debt?—To a certain extent, they do, because they reduce credit.

66,938. Have you any information based on any inquiry as to the purposes for which people mortgage land in this Province?—I do not remember any inquiry on that. There are always figures collected for the number of mortgages and the class of persons to whom the mortgages are made, but the object of the mortgage has not been included.

66,939. Is it possible to give any information as to whether the greater number of these mortgages and sales were for productive or for non-productive purposes?—I am afraid I could not answer that.

66,940. Have you any figures showing owners' holdings?—What do you mean by owners?

66,941. You refer to tenants' holdings. I mean the person who pays the land revenue?—If you mean the proprietors, there are figures for the areas where there have been settlements; but the figures are not accurate because the areas which are shown as in direct cultivation by the proprietors or other landlords are, to a large extent, really held on produce rent by tenants.

66,942. I am trying to find out whether, in this Province, there is any considerable class of petty proprietors who have twenty-five acres and less?—Yes, in some places there are.

66,943. Have you any figures at all for that class?—The figures would show for each unit the amount of land which was held by a proprietor, by tenure holders and by ryots of various classes. The figures for proprietors or tenure holders would not really show the amount which they actually cultivate by their own labour or by their own hired servants, because a large amount is cultivated on produce rent by tenants.

66,944. It is not possible to state what acreage is cultivated by the actual proprietors?—I do not think it is possible to give accurate figures, for the reasons I gave you.

66,945. *Sir Thomas Middleton*: Has the point not been discussed in the settlement reports?—Yes, I think it probably has. It has certainly come to notice very often. You get a large amount of land which you know is actually cultivated by tenants and which is all recorded as being under direct cultivation by the proprietor. You cannot get the tenants to come forward and claim it. That is a very constant occurrence.

66,946. Are tenants in this Province mostly tenants-at-will on a yearly tenancy, or are they occupancy tenants?—Practically all are occupancy tenants.

66,947. *Dr. Hyder*: Even those people who pay produce rents?—In the majority of cases they are occupancy tenants by law, but the general custom in the Province is not to recognise the legal occupancy rights which exist in those holdings.

66,948. *Mr. Calvert*: In answer to one of my colleagues you referred to *damdopat*. You actually used the phrase "The interest cannot exceed the principal." What is the actual law? The interest decreed cannot exceed the principal, is that so?—I think so.

66,949. That is to say, the debtor may have paid off in interest money double the principal, but still the court can give a decree for interest not exceeding the principal?—I think so, but even then the amount decreed will be very much less than in other parts.

66,950. *Babu A. P. Varma*: On page 284 of your written statement you say: "In Champaran although only 2·9 per cent is ordinarily irrigated from Government canals, twenty-one per cent is protected and

irrigable from them." Can you tell me, please, whether this extension can be made with advantage?—I am afraid I could not tell you. These figures are taken from Mr. Sweeney's final Settlement Report.

66,951. You say, on page 285, that there is a prejudice among the Hindus of the higher classes that these industries are debasing and not fit to be taken up by them. May I know whether there is a majority of the higher classes in this Province over the lower classes?—I should say that there is a majority of the lower classes over the higher classes.

66,952. Could we introduce these industries with advantage among the lower classes?—I do not know.

66,953. The lower classes can take to poultry farming and things like that, can they not?—I suppose they can.

66,954. *Dr. Hyder*: Do you not think that the lower classes look up to the higher classes for a lead?—I think so.

66,955. *Babu A. P. Varma*: On page 286, you talk of the evils of the *thikadari* system. May I know whether the evils of that system are prevalent even now?—Yes, I think they are prevalent in these parts.

66,956. From which part have you derived your experience?—From Hazaribagh.

66,957. Do you know anything about North Bihar in regard to this *thikadari* system?—Not very much.

66,958. Do you think that *abwabs* are still prevalent there?—I do not think I can say anything about North Bihar.

66,959. With regard to the granting of receipts, may I know whether it is possible for the ryot to go to the court and obtain his relief there, and compel the zamindar to take his receipt?—It is possible for a court, on the complaint of a ryot within three months of the date from which the receipt should have been issued, to take up the case under Section 58.

66,960. Do you mean to say that the ryots do not go to court against their zamindars at all?—I should say that they seldom do so, unless there is a dispute about the land.

66,961. In this respect also, you do not know anything about North Bihar, I take it?—I have never had a complaint of this kind from a ryot when I was a Sub-Divisional Officer in North Bihar.

66,962. You know that there is a big *Raj* called the Bettiah Raj, and there are many planters there who have taken to the *thikadari* system. Do you know if they grant receipts to their tenants?—I have no personal knowledge of that.

66,963. You say that the settlement operations cause a good deal of harassment to the people, but you want these for the sake of agricultural statistics?—No, I do not want them for the sake of agricultural statistics only; that is a very minor matter.

66,964. Would you like to have your agricultural statistics at the harassment of the people?—The harassment of the people is necessary for greater reasons than agricultural statistics. You must take into consideration the many other reasons which make it necessary for a settlement to be held at intervals in the country.

66,965. *The Chairman*: At the beginning of your examination you told the Commission that, in your view, you did not think that the permanent settlement was an obstacle to the creation of Government irrigation schemes. Apart from the revenue, the direct result of charges for water, is it, broadly speaking, true to say that under the permanent

settlement Government is in no position to acquire by taxation any part of the increment which may be expected to result from the irrigation of a tract which lacks water?—Yes, that is correct under the legal position as it stands at present.

66,966. Does that suggest some difficulty in financing progressive agriculture in areas permanently settled, or can Government recoup itself in other directions?—It is a general matter of the revenue; it does not seem to apply to irrigation any more than to anything else.

66,967. I am prepared to hear your views on the general question?—I mean to say that, where there is a permanent settlement and therefore the land revenue is small and cannot expand, more revenue has to be obtained from other sources.

66,968. *Sir Henry Lawrence*: How is an irrigation scheme to be made remunerative?—On the charge for the water. The Son Canal scheme, I understand from the reports, is practically remunerative though it is in a permanently settled area.

66,969. What does it pay?—I am afraid I could not give you the figures off hand.

(*The witness withdrew.*)

Babu Mithila Saran Sinha, Advocate, Bankipur District, Patna.

Replies to the Questionnaire.

QUESTION 8.—IRRIGATION.—(*a*) (i) In all the south Gangetic districts of Bihar, *i.e.*, Shahabad, Patna, Gaya, Monghyr and Bhagalpore, most of the land is under paddy and requires irrigation from June to the middle of October, which is the rainy season in Bihar, so that slight irrigational help from canals, whenever needed, will suffice.

In other parts of these districts, where, owing to the existence of any river or rivulet it is practicable to introduce irrigation by the canal system, non-perennial canal irrigation, *i.e.*, for the paddy season only, should be introduced.

Irrigation by the *bund* and *pyne* system from small rainy season rivulets, which is already in vogue in these districts, requires encouragement and improvement.

(ii) Irrigation by tanks and ponds is in vogue in hilly districts. In such parts it is the only efficient method. It ought to be introduced where it does not exist and improved where it exists.

(iii) In the said districts, only *dih* land which formerly produced poppy, and now produces potato, sugarcane, onion, wheat, barley, etc., is irrigated by wells. Boring of the well increases its efficiency. The well irrigation system should be extended and improved by boring.

(*b*) Many villages of the canal districts, which canal water can reach, are not supplied with water for irrigation purposes. This want should be removed by the construction of new distributaries and village channels.

QUESTION 9.—SOILS.—(*a*) (i) Drainage at the proper time is invariably necessary for *rabi* land, so that it may be sown at the proper time. Even in the best *rabi* land, if it be not drained off at the proper time, the yield will be nothing or very scanty.

Babu Mithila Saran Sinha.

(ii) Alkali (*usar*) land which produces nothing can yield bumper paddy crops if it gets sufficient irrigation by canal or otherwise, or such land can be beneficially used for growing groundnut.

(*b*) (i) In Patna district, within my recollection, sandy *taur* land which formerly yielded scanty coarse crops such as *marua*, etc., now yields bumper paddy crops with canal irrigation.

(ii) In Patna and Saran districts, to my knowledge, there are instances in which the best *rabi* growing lands have deteriorated for want of timely drainage.

(*c*) The Government should encourage reclamation of uncultivable land (1) by extension of canal irrigation under the Major Irrigation Act No. 3 of 1873, (2) by introduction of irrigation under the Minor Irrigation Act, (3) by passing a Drainage Act.

QUESTION 10.—FERTILISERS.—(*a*) In my opinion green manure such as *dhaincha* and *sann*, may be profitably used to manure paddy land. *Dhaincha* or *sann* seed, at the rate of about five to ten *seers* a *bigha* should be sown in paddy land, after ploughing and cross ploughing the land about the middle of June (*Adra nakshatra*). When the plants are about three feet high, they should be cut, and mixed with the soil in the puddling operation and allowed to rot for two or three days in mud and water and then, after the land is ploughed and harrowed, the paddy seedlings should be transplanted. The result will be a luxuriant growth of paddy with a heavy yield.

(*f*) I would suggest that the cultivators should grow *rahar* in a portion of their holding and use its roots and branches after they are separated from the grain as fuel, thus saving cowdung for manure. Cowdung is the best manure for paddy land. In this way every cultivator, however poor he may be, can get manure very cheaply.

Oral Evidence.

66,970. *The Chairman*: Babu Mithila Saran Sinha, you are an Advocate of Bankipur in the Patna district?—Yes.

66,971. Are you a practical agriculturist?—Yes. I have some land which I am cultivating myself.

66,972. Do you control the details of your own cultivation?—Yes. I follow the legal profession, but occasionally on Sundays I go and supervise my agricultural operations and give directions to my labourers.

66,973. How many acres do you yourself farm?—About twenty-six acres.

66,974. And how many acres do you own? Are you a zamindar?—I have a small zamindari as well.

66,975. What is the principal crop grown on those twenty-six acres?—Paddy and *rabi* crops.

66,976. What kind of *rabi* crops do you grow?—On paddy land it is *paira rabi;* it is scattered while the paddy is growing and then the water is drained off and the *rabi* germinates and grows.

66,977. What is the seed? Is it *kesari*?—It is *kesari* and also some other things, but generally it is *kesari*. Gram, *masur* and linseed mixed with *kesari* are also grown.

66,978. What other *rabi* crop do you grow?—*Paira rabi, kesari* generally and *bhith rabi* which is sown by the plough. The difference

is that in *bhith* land there is no *paira rabi; paira rabi* is scattered while the paddy crop is standing.

66,979. How many plough oxen do you keep?—Four.

66,980. Have you any difficulty in providing sufficient forage for them?—Sometimes; when there is drought the produce is scanty and fodder also is deficient.

66,981. I see from your note that you are enthusiastic about the possibilities of extending minor irrigation schemes?—Yes, minor irrigation schemes as well as private irrigation schemes. In fact two Acts have been passed in the local Council, the Minor Irrigation Act and the Private Irrigation Act, in 1923.

66,982. You are anxious that well irrigation should be extended?—Yes.

66,983. Tube wells should be sunk; is that so?—Tube wells also may be introduced; but, by boring, the efficiency of the existing wells might be increased.

66,984. Are you looking to Government to do this, or do you think private enterprise may be sufficient?—I think if loans are given to the agriculturists by the Co-operative Department they can do it themselves. There are many private boring companies, and the agriculturists can get it done by them more cheaply.

66,985. You are not one of those who want Government to help them; you think you can help yourself?—Occasionally Government might help. The district boards might keep a few boring plants.

66,986. Have you any personal experience of growing groundnut on land that is alkaline?—Not on alkaline land, but on ordinary land. I was secretary of the agricultural association, and I got information that in Bihar sub-division groundnut was grown in *usar* (alkaline) land with much success. I heard that the more alkaline the land was, the better the crop they got.

66,987. The information that you can grow groundnut on *usar* land reached you as a rumour; it has no foundation in any experiment?—As secretary of the District Agricultural Association I got the information from the department that, in the Bihar sub-division, groundnut cultivation on *usar* land was very profitable.

66,988. Was it from Pusa that you got the information or from the provincial Department of Agriculture?—From the provincial Department of Agriculture.

66,989. In your answer to Question 9, paragraph (*c*), you say that Government should encourage the reclamation of uncultivable land by extension of canal irrigation under the Minor Irrigation Act. What Act is that?—The Minor Irrigation Act referred to was passed by the local Legislative Council; it is to regulate the course of rivers and rivulets in such a way as to afford facility for irrigation.

66,990. I see. You want Government to introduce irrigation schemes under that Act?—Yes.

66,991. You advocate a Drainage Act. What is your object exactly?—Drainage is not less important than irrigation. If the land is not drained at the proper time, *rabi* cannot be sown in time, and if *rabi* is sown late it will yield very little crop. Therefore I suggest that a Drainage Act should be passed in the same way as an Irrigation Act has been passed, so as to make provision for draining off water from the *rabi* growing areas in order to enable *rabi* to be sown at the proper time.

Babu Mithila Saran Sinha.

66,992. Are you thinking of existing drainage channels or are you thinking of the cutting of new channels, or both?—Both.

66,993. You say that you have four plough oxen?—Yes.

66,994. Do they provide enough manure for the whole of your paddy land?—We can afford only to give cowdung manure, but there is not sufficient quantity of cowdung manure to manure all the land.

66,995. To what lands do you apply cowdung manure?—To transplanted paddy land.

66,996. Have you ever attempted to purchase cowdung manure from persons living in the neighbourhood of your own holding?—I have never purchased cowdung manure; no one sells it.

66,997. Have you ever asked them to sell it to you?—It is kept by agriculturists, but they use it for their own land.

66,998. Is not a good deal of it wasted, burnt or left about by the roadside, and so on?—No; it is not so.

66,999. Would you be surprised to hear that one planter who is engaged in growing sugarcane not very many miles from this town informed me that he bought annually large quantities of cowdung from the people of the neighbourhood, and he found that he was able to obtain it at a price which made the investment a highly remunerative one to him?—I have not come across such a case. I have neither purchased nor sold cowdung; and I have not seen such transactions.

If you go outside your farm and attempt to purchase cowdung you will, I believe, be astonished at the amounts readily obtainable.

67,000. *Babu A. P. Varma*: If I remember right, you said that if you grow *rahar* on a portion of your land that will be sufficient for fuel. Do you think it will be quite sufficient?—I think so, if sufficient area be sown with *rahar*.

67,001. Do you speak of your own district or of the whole Province?—I cannot speak of districts other than my own; but I know that it is possible in Patna and Saran.

67,002. *Sir James MacKenna*: You say, on page 299 of your note: "In my opinion green manure such as *dhaincha* may be profitably used to manure paddy land". Have you tried *dhaincha* in your own twenty-six acres?—Yes.

67,003. Did that considerably increase the outturn?—The growth was luxuriant and the yield of paddy was also better.

67,004. Have you also tried the method of saving cattle manure by growing *rahar* for fuel?—Yes; I grow *rahar*.

67,005. You use its roots and stalks as fuel?—Yes.

67,006. You back up your precept by example?—I do that.

67,007. *Professor Gangulee*: What yield of paddy per acre do you get?—It varies with different years; for instance this year there was a very poor yield on account of drought.

67,008. What is the yield in a very good season?—On an average ten *maunds* per bigha.

67,009. Cleaned rice or paddy?—Paddy.

67,010. Could you give us an idea of the cost of cultivation per *bigha*?—Not less than eight or ten rupees.

(*The witness withdrew.*)

Mr. Gurusahai Lal, M.L.C., Vakil, Bihar and Orissa.

Replies to the Questionnaire.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) The first main cause of indebtedness is failure of crops over a period of two or more consecutive years; the next is marriage and *shradh* expenses which the agriculturists incur according to the old traditions of the family. Owing to the rise in prices of commodities and labour, they have to spend much more than they can afford. In most cases, owing to the caste system, poor people do not get brides for their boys unless they pay a very high price; this is also one of the causes of their indebtedness In some cases all the cattle die of disease and they have to borrow in order to purchase others. Then, too, comes litigation, specially with the landlords.

(ii) Sources of credit: The villagers borrow money from the village moneylender at a very high rate of interest, so that even when they go on paying as much as they can save, the debt is not satisfied.

(iii) The main reason preventing repayment by the agriculturists is the bad method of living. They would not sell their grain at the earliest opportunity but would wait in the hope of good prices, but they lose heavily on account of the high rate of interest which they have to pay. In some cases, on account of bad storing arrangements they lose the major portion of their grain if the building gives way in the rainy season. Next, the village moneylenders usually demand only the interest and not the principal so that they may have a permanent source of income. It is not unusual for the same debt to continue from generation to generation although each year the interest is paid.

(*b*) The measures necessary for lightening the agriculturists' burden of debt are:—

(i) Enforcement of the Usurious Loans Act is highly necessary. It must be made clear by circulation of notices in the vernacular that loans at excessive rates of interest will be legally invalid. The principle of *damdopat* should be adopted. The officers of the co-operative societies and members of local and district boards should be asked to get such notices circulated. It should be impressed on the agriculturists as well as on the village *mahajans* that loans at excessive rates of interest are invalid and that the interest should not exceed the principal amount in any event.

(ii) When the crops are ready on the threshing floor the agriculturists should be made to repay as much of the loan as they reasonably can. A system of compulsory repayment of debts should be introduced.

(c) In my opinion it would not be desirable to restrict or control the credit of cultivators by limiting the right of mortgage and sale, unless the holdings become non-transferable even in execution of decrees for rent.

Non-terminable mortgages should not be prohibited. Such a measure would not lighten the burden; rather, the apprehension is that it might increase the burden in most cases.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—There is great loss in agricultural efficiency owing to excessive sub-division of holdings.

The holdings consist of plots; in most cases the plots are also subdivided on account of partition and the loss in efficiency becomes much greater. Statutory provision should be made to render possible the exchange of plots, and such exchange should be compulsorily recognised by the landlords. Legislation similar to the Estates Partition Act should be passed giving the right to amalgamate two or more plots or two or more holdings situated in one estate, and some revenue officers may be placed in charge of such cases.

QUESTION 8.—IRRIGATION.—(*a*) Gaya, the major portion of East Patna and South Monghyr.

The irrigation system of these districts depends mainly upon seasonal rivers and their tributaries. The canal system will not improve the position. The rivers and their tributaries often change their courses. Government should arrange that no course of these rivers should be allowed to dry up. Shakri, Panchaney, Falgu in Patna district (the portion called Bhutahi) have changed their courses with the result that the villages which used to be irrigated by the old courses of these rivers suffer from drought while the villages which lie by the side of new courses suffer from constant floods.

The system which I advocate for these districts is the training of these seasonal rivers in such a way that no course may dry up. During the rains and soon after, the courses of these rivers should be constantly examined by expert engineers. Culverts should be erected and small channels dug out with the help of the local cultivators. A system of reservoirs should be revived, lands being acquired if necessary.

Rajgir Kund Water.—Water from the stream should be collected again, stored and used for irrigation purposes.

QUESTION 9.—SOILS.—(*a*) (i) Soils can be improved, firstly where the flood water does not enter the land (1) by improving the irrigation facilities, (2) growing crops which serve the purpose of manure *e.g.*, *sann*, (3) by manuring, and (4) where flood water comes, the system of making *aris* or *trais* should be popularised so that a layer of fresh earth may accumulate and the soil may be highly improved.

(ii) The best method of reclaiming sandy and unculturable land is by the cultivation of groundnut but it is being introduced only by co-operative societies. It should also be done through local and district boards. In sandy land the cultivation of *til* has also proved successful. *Til* or some other crop which may be proved by research to be a good crop for sandy land should be introduced.

As to alkali (*usar*) or *rehara* land, the only method of reclamation which the experience of agriculturists has discovered is the improvement of the irrigation system. If the land, though alkali, has good irrigation facilities, paddy would grow, but certainly *rabi* cannot be grown in such land. If, by arrangement, flood water can be let on to such land so that fresh earth is deposited, the soil is bound to improve a great deal.

(iii) Erosion of surface soil by flood water can be prevented if good *aris* or *trais*, (ridges) which would vary according to the current of the flood water, are established all round the plots or all round a block containing several plots about twenty-five to thirty acres in area so that the flood water may not pass out in a great rush, but slowly.

The second method of preventing such erosion of surface soil is not to allow any very great difference in the levels of several blocks of the same village or neighbouring villages.

The water channel should be clearly defined; it should not be narrow but as wide as possible.

Arrangement should always be made for the discharge of flood water.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) In some parts of the Patna district, *i.e.*, the parts which are not irrigated by the canal system and that which is called *tal* land, in other words, where sugarcane and *rabi* crops are grown by irrigating the fields from well water, the cultivators are engaged on their holdings throughout the year. On some particular days when they do not do field work, they make ropes.

But the tenants of *tal* land (*i.e.*, Mokameh Tal) where the land remains submerged during the rainy season (from the middle of July to September) the males as well as the females have no work to do on their holdings and they while away their time in play.

Besides those named above, some cultivators have a slack season just after transplantation of paddy and soon after the threshing of *rabi* crops. During those days, in the Patna district the cultivators do not do any cultivating work. At places where *sann* is grown they make ropes for domestic purposes.

(*b*) For females the *charka* should be revived, while for males rope-making or spinning of cotton on *tiklis* should be introduced; this will keep them engaged and will provide them with cloth or ropes for their own use.

Cottage industries which do not require any valuable machinery but only require easily available machinery should be introduced in the villages.

(*c*) The villagers of this part of the country do not know anything about industries like bee-keeping, sericulture and lac culture. The villagers would not on any account take an interest in the poultry-rearing or piscicultural industries but may take an interest in bee-keeping, sericulture and lac-culture. As they are quite ignorant of these industries, various obstacles may arise. The agriculturists of this part seldom take to new industries but, if, with the help of co-operative societies and of the local boards, some energetic and industrious people are given proper instruction and some of the people take the lead, these industries may develop in the course of ten to twenty years.

The villagers would at once take to the rope-making and basket-making industries. They are accustomed to such industries, and have been carrying them on to a certain extent.

(*d*) I do not think Government should do more to establish all the industries named in this question, but some of them, *e.g.*, utilisation of cotton seed for fodder and of rice straw for paper, may be established and may prosper.

(*e*) Only cottage industries will prosper in rural areas and people may take to those industries as a subsidiary employment. The materials for cottage industries should be properly supplied through some agency and the articles prepared should be sold in the market or through the same agency.

(*f*) I do not recommend a more extensive study of each rural industry.

(*g*) I would suggest that cottage industries only might lead to greater rural employment. Introduction of any big mill or any other big industrial concern would not improve the situation in regard to rural employment.

Mr. Gurusahai Lal.

Oral Evidence.

67,011. *The Chairman*: Mr. Gurusahai Lal, you are a member of the Legislative Council in the Province of Bihar and Orissa?—Yes.

67,012. What is your own personal experience of agricultural matters?—I have got some personal experience of cultivation.

67,013. Do you own land?—Yes.

67,014. Are you cultivating it yourself?—Yes, I am cultivating it myself.

67,015. Do you direct the operations of the farm?—I myself do it sometimes, but being a lawyer I do not generally remain there.

67,016. How much land are you cultivating?—About seventy acres.

67,017. What are your principal crops?—Paddy and *rabi* crops; sometimes *bhadai* as well.

67,018. Have you zamindari interests as well?—I have a small zamindari interest also.

67,019. How many acres?—About fifty acres.

67,020. In answer to Question 6 (*a*) (iii), you give it as your opinion that one of the principal causes preventing the repayment of debt is the holding up by the cultivator of his produce in the hopes of obtaining better prices?—Yes, that is so.

67,021. Are you satisfied that that statement is correct?—In most cases, I have seen that it is so.

67,022. Does it not mean, in effect, that cultivators are borrowing money in order to hold up their crops?—No. After having borrowed money, they do not repay as soon as they get the crop. They hold it up for some time in the hope that they will get better prices.

67,023. If, in effect, you postpone the repayment of a loan for a period for a certain purpose, you are in fact borrowing for that purpose; is that not so? Is it not one and the same thing?—Certainly, interest increases and that leads to further borrowing.

67,024. At what rate of interest is this money borrowed?—At eighteen to twenty-four per cent per annum.

67,025. Do you think it pays the cultivator to hold up his crop in order to get a better price, when he is financing that marketing operation at a rate of interest equal to twenty-five per cent per annum?—Sometimes they get better prices and therefore they hold it up; in most cases they lose.

67,026. Do you really think that this practice is common among agriculturists?—It is common among agriculturists.

67,027. Where are these crops stored during this period of holding up?—In their mud-built houses.

67,028. In the cultivators' houses?—Yes.

67,029. Have the cultivators at their disposal storage sufficiently commodious to hold up crops on any important scale?—They can hold up for, say, one season.

67,030. In answer to Question 6 (*b*) (i), you are dealing with the Usurious Loans Act. Have you experience of that Act in this Province?—Yes, I have some experience of it. The officers allow interest even at the rate of eighteen to twenty-four per cent because it is their sweet discretion to allow that interest. No fixed rate has been laid down in the Usurious Loans Act; it is left entirely to the discretion of the officers.

67,031. Are the terms of the Usurious Loans Act well understood by any important proportion of the cultivators?—No, they do not know the Usurious Loans Act as yet.

67,032. In answer to Question 7, you mention the Estates Partition Act. Would you tell us, quite shortly, what the provisions of that Act are?—The Act is enacted for the partition of zamindari interests; several landlords partition among themselves one estate according to their shares, and thereby the holdings of the tenants are also subdivided.

67,033. With reference to your answer to Question 8 (*a*), under the heading 'Irrigation': How do you propose that Government should arrange that no course of any river should die out? I do not quite see how Government can do it?—Government officers may look into the courses of rivers just after the monsoon and find out whether any course is going to dry up, and if it is, then certainly Government should, under the Minor Irrigation Act, or at its own instance, see that that is not allowed to happen.

67,034. What steps would you take if you were holding the position of an irrigation officer and you saw the water courses drying up? Where would you get the water with which to fill up the courses again?—What I mean is that the old courses should continue. I have found that old courses have been dried up and new courses have been formed. Thereby, the villages that were irrigated by old courses do not get water and their crops suffer from drought, and the villages irrigated by the new channels constantly suffer by floods.

67,035. No two cases would probably be alike. In some cases it may be possible, by methods of river conservancy, to counteract the natural tendencies, but in other cases expenditure would be out of all proportion to the advantage?—In some cases it may be so.

67,036. In answer to Question 17 (*f*), you say "I do not recommend a more extensive study of each rural industry". What, exactly, had you in mind when you gave that reply?—I have mentioned this because I find that in rural areas the cultivators do not take to new implements, and they are apt to follow the old methods.

67,037. Follow the ancient method?—Yes, the old method of ploughing.

67,038. What are you thinking of when you mention rural industry?—I have suggested that regarding the introduction of improved tools and appliances.

67,039. Are you thinking of subsidiary industries like basket making and things of that sort?—I had that in mind also.

67,040. About this business of subsidiary industries, why do you not want attention paid to these cottage and village industries which, in some cases, make a very substantial contribution towards the income of the cultivator?—I am in favour of cottage industries.

67,041. *Sir Thomas Middleton*: On page 302 of your note of evidence you say "In my opinion it would not be desirable to restrict or control the credit of cultivators, such as the right of mortgage and sale, unless the holdings become non-transferable". Were you thinking of some such legislation as they have in the Punjab to prevent the alienation of land?—I am not in favour of preventing the alienation of land. If the land is held to be non-transferable, it should be non-transferable even in execution of rent decrees, because, although they are forbidden to alienate the land to others, it very often goes into the hands of the landlords.

Mr. Gurusahai Lal.

67,042. Even if it is non-transferable?—Yes. The Bengal Tenancy Act lays down that even if it is non-transferable, it is saleable in execution of rent decrees.

67,043. To certain classes?—To the landlords.

67,044. With reference to river courses, what you want is that after the monsoon certain channels should be cleared out?—Yes.

67,045. Is there no possibility that the villagers themselves would, by co-operation, get their channels cleared?—What I mean is that expert knowledge is required to see whether there is any tendency for the river to change its course. That can be done only by expert knowledge.

67,046. I should think that if a channel was getting blocked, it could be quickly put right by the people on the spot?—I am referring to cases where there is a tendency for the river to change its course. It does not change its course in one year only. It takes several years, and experts can detect that tendency a few years before.

67,047. *Babu A. P. Varma*: You say, in answer to Question 6 (*a*) (i): "Then, too, comes litigation, specially with the landlords." I do not understand what you mean by "specially". Will you please explain?—Litigation with the landlords is always ruinous.

67,048. And not litigation between tenant and tenant?—Between tenant and tenant the matter is settled easily, but with the landlords it is not settled easily.

67,049. What is the nature of that litigation? Is it with reference to rent receipts?—As soon as litigation with the landlords is started, several sorts of disputes, criminal and civil, arise.

67,050. On page 302, about the Loans Act, you say that it must be made clear, by circulation of notices in the vernaculars, that loans at high rates of interest will be invalid in law? Do you think that the mere circulation of notices will do?—That alone will not be sufficient, but it will have the effect of checking the practice to a large extent.

67,051. You want only to check it and not to stop it entirely?—The principle of *damdopat* might be adopted, namely, that the interest should not be higher than the principal.

67,052. You say that rice straw may be used for making paper. What is the chief fodder for your cattle? Is it not rice straw?—That is so.

67,053. Will there not be difficulty about fodder if your suggestion is adopted?—If this is used in industries, then some other fodder crop will have to be grown.

67,054. *The Raja of Parlakimedi*: How do you cultivate your fields?—By some permanent labour as well as some hired labour.

67,055. How many permanent labourers have you got?—About fifteen.

67,056. Do you pay them in cash or in kind?—In kind.

67,057. Do you also advance them money?—Yes, sometimes I do at the time of their marriages.

67,058. Do you charge any interest?—No.

67,059. How do you recover it if it is a large advance?—It is not much. It goes up to fifty, sixty or a hundred rupees.

67,060. How is it paid?—In instalments.

67,061. How do you pay your labour?—I pay them daily their food as well as three *seers* of grain.

67,062. The permanent labour is also paid daily?—Yes and they are given some land as well to cultivate.

67,063. Do you grow your crops in rotation?—The sugarcane crop is grown in rotation.

67,064. After growing sugar cane what do you rotate it with?—Sometimes gram and sometimes barley.

67,065. Have you been applying any manures demonstrated by the Agricultural Department?—No, only cowdung is being used.

67,066. Why?—Because I find that the soils deteriorate.

67,067. You mean to say that the soils deteriorate after manuring?—The yield of crop is high but if manure is not applied continuously the soil deteriorates.

67,068. This is something new. Have you been applying any green manure?—We grow *sanai*.

67,069. Do you grow it extensively as green manure?—Certainly; we grow it and it is ploughed in.

67,070. Do you do it every year?—Yes.

67,071. For what crops?—Paddy.

67,072. What manure do you apply for sugarcane?—Only cowdung is used.

67,073. Are you interested in cattle?—Yes.

67,074. Do you maintain only working animals or do you breed cattle?—We only maintain bullocks and buffaloes.

67,075. How many pairs of animals do you keep for working?—I have four pairs of bullocks and four pairs of buffaloes.

67,076. Do you give them any concentrated food or do you simply allow them to graze?—We give the bullocks concentrated food both morning and evening. Buffaloes are allowed to graze and in the evening they are given a feed.

67,077. What feed?—Paddy straw.

67,078. You do not give any grain?—Very seldom.

67,079. Are they very powerful animals?—They are.

67,080. You consider paddy straw to be good enough as concentrated food, do you?—Yes.

67,081. *Professor Gangulee*: Are you elected to the Council from a rural constituency?—Yes.

67,082. What constituency?—East Patna Non-Mahommedan, rural.

67,083. Could you tell us what is the primary need of your constituency?—The primary need is irrigation facilities, and then a portion of my constituency suffers from caterpillars.

67,084. You live in your own constituency?—Yes.

67,085. Have you interested yourself in the co-operative movement?—No. I have not.

67,086. Have you interested yourself in the work of the Agricultural Department?—Sometimes I have.

67,087. Do the people in your constituency come to you at any time for help in the matter of obtaining seeds and so on?—They give me information regarding the destruction of their crops by caterpillars.

67,088. Is there a co-operative society in your constituency?—Yes.

67,089. On page 302, you suggest that a system of compulsory repayment of debt should be introduced? What sort of system are you thinking of?—What I mean is that at the time of harvest, they should be told to pay as much as they can spare. By "compulsory," I mean that each year they should pay up as much as they can.

67,090. Are you thinking of legislation?—Legislation may help a great deal.

67,091. Have you drafted any such bill yourself?—No.

(The witness withdrew.)

Mr. K. R. BERY, Superintending Engineer, Irrigation, Orissa Circle.

[*Mr. K. R. Bery was examined on the following replies to the questionnaire submitted by Rai Bahadur Bishun Svarup, Secretary to the Government of Bihar and Orissa, Irrigation Department.*]

Replies to the Questionnaire.

QUESTION 8.—IRRIGATION.—(*a*) (i) All the canals in the Province are perennial, except the Tribeni canal from the river Gandak which can be fed only during the rainy season and supplies water for *kharif* crops only. The Saran canals are also inundation canals fed from the same river, but these have been rendered useless, owing to the river having shifted to the opposite bank, so that water reaches the head sluices during high floods only.

In the existing canals there appears to be little scope for any new schemes or extensive developments. As the result of experience a few minor improvements in the working of the canals are effected from time to time.

The prospects of any extension of irrigation by means of new canals are also not very bright in the Province.

North of the Ganges, all the rivers except the Gandak debouch from the hills on to the plains in the territories of Nepal and then enter the Province. It is not therefore possible to control these rivers, in order that their water may be utilised for irrigation through regular canal systems.

The rivers of South Bihar are, excepting the Son, generally too small to feed any canal systems. They are, however, fully utilised for irrigation by an extensive system of dams and *pynes*, the different villages through which they pass having recorded rights to use the water. The upper reaches of several of these rivers were examined to see if it was possible to construct reservoirs for storing water during the rains to be utilised for irrigation, but the schemes were not found feasible. One to provide irrigation in the Bhabua sub-division of the Shahabad district is still under consideration, but is not very promising.

Some minor irrigation schemes are being examined in South Bhagalpur. The rivers here depend entirely on rainfall and their supply cannot be relied upon.

Chota Nagpur, owing to its hilly area and comparatively smaller streams, does not offer a field for any large irrigation projects. A small scheme from a local river in Palamau district has just been completed, and one in Singhbhum district is under examination.

In Orissa we already have an extensive system of canals, utilising almost all the big rivers for irrigation, and no additions are needed. The average rainfall in Orissa is high, and artificial irrigation is not ordinarily resorted to. This is why the canal is a losing concern in this part of the Province.

(ii) Bihar has a good system of irrigation tanks, called *aharas*, from which irrigation is effected by means of channels, called *pynes*. In places where canal irrigation has been made available, the *ahara* system has been abandoned and the *aharas* cultivated. This has not been a step in the right direction for the areas where there is difficulty of irrigation from canals. In such cases it would have been more advantageous to retain the *aharas* which could be filled up from the canal during intervals between heavy demands when there is water to spare.

Aharas in such places may advantageously be revived.

(iii) Well irrigation is practised on a very limited scale in the Province, and the cultivators seem content as a rule to rely on the facilities afforded of irrigation from the canals, at any rate during the *kharif* season. There seems, however, no reason why well irrigation should not be attempted during the hot weather and *rabi* seasons in places where irrigation from the canals is not feasible. This irrigation might be effected by means of *motes* or the Persian wheel system, such as is done in the United Provinces and the Punjab. Tube wells may also be utilised profitably. At present, in cases where well irrigation is practised, the water is usually lifted by a *latha* and *kundi* (a sort of lever arrangement) which is a very primitive and slow process, and the outturn is poor.

(*b*) The existing method of distribution of water on the canals in Bihar, *i.e.*, through village channels for separate small blocks, has worked satisfactorily on the whole. The outlets supplying these village channels consist for the most part of the simple orifice type with screw gear shutters, which, though capable of improvement, are working well. There does not therefore appear to be much necessity for any material change.

In Orissa the blocks are very large and irrigation has to be carried on from field to field. There is consequently great wastage of water. The people are averse to making village channels as is done in Bihar. Government cannot afford to make these channels out of its own funds because, as said above, irrigation in Orissa is a losing concern. It has its distributaries and sub-distributaries.

No special methods are employed to prevent wastage of water by evaporation or absorption in the soil. The atmosphere during the rainy season, when the majority of irrigation is done, remains comparatively moist and the loss from evaporation is not a very important consideration. Wastage from absorption in the soil too is not very great, as the silt deposited from the river water forms a fairly impervious lining on the bed and banks of the canals and distributaries.

No special type of outlets is used for the tail end of a distributary which is generally blocked. The supply of water in a distributary, sub-distributary, or village channel is regulated at its head, and is restricted to the quantity required to irrigate the area under command. The supply in the lower reaches is not infrequently reduced owing to the cultivators in the upper reaches illicitly taking more than their share of water, and the department has to take special care to see that the areas on the lower reaches are properly irrigated.

Mr. K. R. Bery.

Oral Evidence.

67,092. *The Chairman*: Mr. Bery, you are Superintending Engineer, Orissa Circle?—Yes.

67,093. I understand that you wish to be examined on the note of evidence prepared by Rai Bahadur Bishun Svarup? Is that so?—Yes.

67,094. Do you agree with him that there is no scope for any new scheme or for extensive developments in the existing canal system?—There is very little.

67,095. For irrigation on a grand scale?—Yes.

67,096. Is the Irrigation Department in this Province responsible for the sinking of tube wells and other wells to be used in irrigation?—No. The Agricultural Department is.

67,097. Entirely?—Yes.

67,098. The Irrigation Department is doing no well boring at all?—None.

67,099. How about the minor schemes of irrigation such as digging tanks, *bunding* small streams and so on? Do they come within your responsibility?—Only if they are referred to us by the civil authorities.

67,100. So that, no propaganda in favour of the adoption of these schemes is carried on amongst cultivators by your department?—No.

67,101. Would it be desirable to have a special officer detailed for work in the districts where these schemes might be made, in order to encourage the cultivators to take them up and in order to give advice?—Two Acts were passed in this Province. One is the Bihar and Orissa Private Irrigation Works Act, No. V of 1922 and the other is the Bihar and Orissa Minor Irrigation Works Act, No. VI of 1922.

67,102. Is it your view, broadly speaking, that an effort might be made to popularise these minor schemes in the districts by propaganda work?—Under the Acts I mentioned just now, the civil authorities have to ask the opinion of the Irrigation Department.

67,103. I quite follow that. Whoever does the propaganda work, is it your view that it ought to be undertaken?—It ought to be.

67,104. Any schemes that are undertaken, small and humble though they may be in comparison with your large canals, will, in the aggregate, be of considerable advantage to the small cultivator?—Certainly.

67,105. I see that the Rai Bahadur thinks that the system of distributing irrigation water in Orissa involves great waste?—Yes.

67,106. But that for financial reasons it is not possible to take suitable steps to remedy that?—Yes, because nobody would make the village channels there for conveying the water to the fields. The irrigation is carried on from field to field.

67,107. And these are not paying schemes?—No.

67,108. So that any extension would increase the loss to Government; is that so?—Yes.

67,109. Now, a question or two about the floods which have unhappily caused so much damage and loss and distress in this Province. Are you familiar with the broad problems of river conservancy which arise in connection with these floods?—Yes.

67,110. What is the history of the floods in Bihar and Orissa? Is it your view that the situation is becoming aggravated?—I do not think the situation is any worse than what it was before; the people make much more noise now than they used to do before.

67,111. Are the main rivers of Bihar and Orissa *bunded* to any extent?—In Bihar only the Son river is *bunded*, and in North Bihar the Ganges is *bunded*.

67,112. Is it single *bunding* or double *bunding*?—Only single *bunding*.

67,113. Is there any case of double *bunding*?—No.

67,114. Do you notice any tendency on the part of these rivers, in those sections where *bunding* exists, to raise their beds?—In some cases in Orissa the beds have been raised.

67,115. Is it the tendency of these rivers to create a ridge on the bank opposite to that which is *bunded*?—No.

67,116. You do not find ridges growing?—No.

67,117. So that the flood escapes with ease on that side of the river which is not *bunded*?—Yes, provided the cultivators do not put up unauthorised embankments.

67,118. Is it a source of possible danger to the best interests of agriculture in the country when they do put up these unauthorised *bunds*?—Yes.

67,119. Are you able to control that situation?—I can only control it on paper; I cannot do so practically.

67,120. That is not much use where floods are concerned, is it?—That is so.

67,121. Have you, in theory, any legal authority?—I have got legal authority in theory but not in practice.

67,122. You have no agency to carry it out?—No.

67,123. Is it your view that, in any important tract in this Province, the bed of a river in that section where *bunding* exists has been raised to such an extent as to raise the level of the river above that of the surrounding lands, and so to bring about a situation in which the river can no longer carry out its normal function as a drain?—That inquiry is in progress and the investigation is not yet complete. The inquiry will be completed in the month of January, 1928, when the expert committee will meet.

67,124. Would you rather not give an opinion on that at this stage?—Yes.

67,125. Is that committee a provincial committee or an all-India committee?—A provincial committee.

67,126. Is it not an inter-provincial committee between Bihar and Orissa and Bengal?—Yes.

67,127. Technically speaking is it a provincial committee appointed by the Bihar and Orissa Government?—Yes.

67,128. Mr. Addams-Williams is to be a member, is he not?—Yes, and also Mr. Harris. Several of these rivers go into other Provinces; for instance, the Son river and the Mahanadi river come from the Central Provinces.

67,129. *Professor Gangulee*: But the catchment area is there?—Yes

67,130. *The Chairman*: As regards drainage, do you think that there are cases in this Province where the railway embankments or road

bunds seriously interfere with the natural drainage?—That was found to be the case in certain places in Orissa.

67,131. It is not enough, is it, to show that at flood times there is a higher level above the embankment than below it: that is inevitable, is it not?—Yes.

67,132. Is it necessary to show that an amount of water held up is doing serious mischief or that at non-flood seasons the land is substantially water-logged in order to make a case against the embankment?—It was found in certain cases that the waterway provided through the railway embankment was not sufficient.

67,133. Could that situation be met in every case by the building of more culverts through the embankments?—Yes.

67,134. That is purely a local condition, is it not?—Yes.

67,135. Do you notice any diminution of the volume of your rivers in this Province as a result of the irrigation schemes higher upstream?—No.

67,136. There is plenty of water for all?—Yes, in fact too much of it.

67,137. To what extent are the rivers passing through the alluvial tracts in this Province tending to change their course from year to year; in other words, to what extent are they wanderers in the lateral direction?—They do not wander very much.

67,138. They are more or less stable?—Except in the case of tidal rivers which make new channels occasionally.

67,139. But you have no case where a movement of that sort gives you cause for serious anxiety?—Sometimes in Orissa one branch silts up and another opens out.

67,140. They play tricks of that sort, but there again it is a local condition. It is not a formidable problem in this Province?—No.

67,141. Is it sufficiently extensive to involve loss of important agricultural land by erosion?—Yes, in the Puri district for example.

67,142. Would you like to see these permanent *bunds* that have been placed along your great rivers removed wherever that was possible, in order to let the floods go?—Yes.

67,143. Do you think, on the whole, it would be in the interests of the community that that should be so?—Yes.

67,144. Are you faced with the water hyacinth problem in this Province?—There is very little of it in Orissa.

67,145. So that now is the time to go for it?—Not in the canals; it is only in the villages where we have got no control whatsoever.

67,146. Are you paying any attention to it there?—As I said, we have got no control over the village tanks.

67,147. But are you on the look out for any extension of the mischief?—There is no water hyacinth in the canals.

67,148. Any in the rivers?—None in the rivers.

67,149. Are your rivers too swift here for the water-hyacinth?—Yes.

67,150. Have you any system of creeks in which it may flourish?—It has not been noticed. Most of the creeks are salt-water creeks and probably the water-hyacinth does not exist there.

67,151. Your creeks are not saline, are they?—The creeks in Orissa are all saline.

67,152. How do you account for that?—Because they are near the sea.

67,153. Your creeks are on the seaward side?—Yes.

67,154. They are not on the Gangetic system?—No.

67,155. My mind was fixed more on the Gangetic system. As regards the northern rivers running from west to east, are there any areas in which the water-hyacinth might be a serious menace to every drainage or water communication?—No.

67,156. Are you quite confident on that point?—Yes.

67,157. I am only anxious, if such had been the case, to suggest immediate and serious attention because the Commission has seen such deplorable results from the lack of early attention to this pest in other Provinces that one would wish to spare this Province the same experience, if possible. To go back to the point: when you talk about these Orissa irrigation schemes being losing concerns, do you mean that they are not paying their way?—Yes.

67,158. The situation is not growing worse?—No, it is not growing worse, but, since the water rate has been increased there has been less tendency to renew the water leases.

67,159. For what period do they rent these water leases?—We generally take long leases for ten years.

67,160. That is by the landlord?—No, by the tenant or the cultivator.

67,161. Is it the undertaking to take so much water as the minimum? What is the nature of the contract?—The contract is that we will supply water from the 16th of June to the 31st of March every year.

67,162. And what is the tenant's undertaking?—His undertaking is that he will pay a water rate of Rs. 3-8-0 a year.

67,163. For a given amount?—For a given area.

67,164. *Sir Henry Lawrence*: Whether he crops or whether he does not crop?—Yes.

67,165. *The Raja of Parlakimedi*: In answer to Question 8 (*a*), it is stated as follows: "The prospects of an extension of irrigation by means of new canals are not very bright in the Province." May I know in what part of the Province?—In all parts of the Province, in Chota Nagpur, in Bihar, and in Orissa.

67,166. Is it because of the excessive rainfall?—Because most of the schemes which have been enquired into are not remunerative. They are only very small schemes and do not pay their way.

67,167. But would they not be protective also?—In some cases they would be protective.

67,168. In what cases would they be protective?—In certain schemes enquired into in Chota Nagpur they would be protective but not productive.

67,169. What is the rainfall in that area?—The rainfall is over forty inches.

67,170. In that area mentioned by you?—Yes.

67,171. Are there any schemes in hand?—There were two schemes enquired into; they were feasible on engineering points, but the civil department did not think them productive, and so they have rejected those schemes.

67,172. *Professor Gangulee*: Since the passing of the two Acts which you mentioned, do you see any signs of the extension of minor irrigation schemes?—This Act applies to Bihar; I have been away from Bihar for two and a half years, but as far as I am aware there has not been a single case under that Act.

67,173. It has not operated?—Not to my knowledge.

67,174. Chota Nagpur, I understand, suffers a great deal from drought?—I am not aware of it; I do not know the condition in Chota Nagpur.

67,175. You are familiar with Orissa?—I am familiar with Orissa and Bihar, but I have been to Chota Nagpur only once or twice.

67,176. Are private irrigation canals increasing?—I could not say, because I have not seen any private canals anywhere.

67,177. Private irrigation schemes?—Private irrigation schemes are mostly in Gaya and Bhagalpur districts; but I have not any knowledge of them to say whether they are increasing, stationary or decreasing.

67,178. Are the water rates collected by the Canal Department or by the Revenue Department?—By the Revenue Department under the Canal Department.

67,179. Do you have a satisfactory contour map of the Province?—I think so.

67,180. The survey has been undertaken?—Yes.

67,181. We have heard a great deal about the system of irrigation practised in the Kanke farm; have you been to the Kanke farm?—No.

67,182. *Mr. Danby*: In the districts of Muzaffarpur and Darbhanga there is no irrigation scheme?—No.

67,183. Is it proposed to undertake any irrigation scheme in those districts?—Not that I am aware of.

67,184. Is there any reason why no irrigation scheme has been undertaken in those districts?—I am not aware of that; schemes have not been investigated as far as I am aware.

67,185. *Sir Henry Lawrence*: What is the largest irrigation scheme in this Province?—The Son Canal.

67,186. What is its capital cost?—About two and a half crores of rupees.

67,187. How much does it pay?—Nearly six per cent.

67,188. That runs through a permanently settled tract?—Yes.

67,189. Have you had no difficulties in administering that canal owing to the permanent settlement?—No difficulty. The water is in great demand there.

67,190. And the tenants pay?—Yes.

67,191. And there are no difficulties with the landlords?—None.

67,192. *Babu A. P. Varma*: Could you give us the percentage of cropped area irrigated in Champaran?—I am not aware of it. As far as I remember, 66,000 acres are irrigated by the Tribeni Canal.

67,193. Could you not give the percentage?—No.

67,194. Is there no scope for extension in the Tribeni canal?—There is no scope for extension in the Tribeni canal; I know that.

(*The witness withdrew.*)

The Commission then adjourned till 10 a.m. on Thursday, the 24th November, 1927.

Thursday, November 24th, 1927.

PATNA.

PRESENT :

The MARQUESS OF LINLITHGOW, D. L. (*Chairman.*)

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

Mr. E. DANBY, Babu A. P. VARMA } (*Co-opted Members*).

Mr. J. A. MADAN, I.C.S., Mr. F. W. H. SMITH } (*Joint Secretaries*).

Mr. H. LAMBERT, M.A., I.E.S., Offg. Director of Public Instruction.

and

Mr. F. R. BLAIR, M.A., I.E.S., Deputy Director of Public Instruction, Bihar and Orissa.

[*Mr. Lambert and Mr. Blair were examined on the following replies to the Questionnaire submitted by Mr. G. E. Fawcus, M.A., C.I.E., O.B.E., Director of Public Instruction, Bihar and Orissa.*]

Replies to the Questionnaire.

QUESTION 2.—AGRICULTURAL EDUCATION.—I have no experience of any form of agricultural education. An experiment, however, is about to be undertaken in this Province. It is proposed to open experimental agricultural classes at five middle schools and endeavours will be made to put to the best use school gardens of about a quarter of an acre in each case. No agricultural theory will be taught, but practical work will be done for four hours a week by each of classes VI and VII. Schools with the necessary facilities will be selected and before work is started one teacher from each school will be sent to Sabour for a short course of training under the Director of Agriculture. The Agricultural Department will help to supervise the experiment by deputing *kamdars* for the purpose.

QUESTION 23.—GENERAL EDUCATION.—(*a*) I have nothing to say on this head beyond what is stated below under (*b*) (iii).

(*b*) (i) I find it very difficult to make suggestions under this head. Life in an Indian village must be exceedingly dull and it is not unnatural therefore that persons of ability and education should seek to

leave the villages and crowd into the towns. Moreover, apart from the question of dullness, I understand that agriculture on a small scale offers no hope of very great profits. The result of this must necessarily be that persons who own little or no land will tend to crowd into towns if they have any ambition.

(ii) My experience is very limited, because in this Province the only rural area in which compulsion has been introduced (the Banki Union in Cuttack) contains only 4,723 males. Experience at Banki shows that it is not difficult to get the names of all the boys on to the school rolls; the last report received shows that the number of boys enrolled was 629. On the other hand, it is difficult to ensure regular attendance, the last reported percentage having been only about 67. This is not unnatural, because if compulsion is to be effective it must be possible to fine, without delay, those parents who do not send their children regularly to school, but in the Municipality of Ranchi I have found that the average time occupied by a case under the Primary Education Act is six months.

(iii) In this Province, stagnation occurs mainly in class I, not class IV, the figures for the 1st of April 1926, being as follows:—

Class I	573,315
„ II	165,927
„ III	101,476
„ IV	36,486
„ V	25,616

For this stagnation there are many reasons:—

(*a*) The teachers in primary schools are very poorly paid, the rates at present prescribed by Government for rural areas being as follows:—

——	Minimum.	Triennial increment.	Maximum.
1	2	3	4
	Rs.	Rs.	Rs.
Teachers who have passed the middle standard and have been trained.	12	1	17
Teachers who have passed a lower standard and have been trained.	10	1	15
Untrained teachers who have passed the middle standard.	8	1	13
Untrained teachers who have passed a lower standard.	5	1	10

It should be noted that, in addition to these rates, the teachers receive about three rupees a month from fees and also a certain amount from casual presents, but even so the rates are much too low to make teaching an attractive profession.

(*b*) The result naturally is that the teachers do not take trouble over their work and teach in the old stereotyped methods instead of adopting the methods which modern practice has shown to be superior, *e.g.*, the boys are commonly taught to write alphabets instead of syllables.

(*c*) In the large majority of schools one teacher has to deal with more than two classes. The inevitable tendency is to neglect the lowest or infant class.

(*d*) Work is much interrupted by the manner in which pupils are sent to school at all times of the year.

(*e*) The habit of parents of sending very young children to school to save themselves trouble.

I am fortified in my opinion that these are the chief causes of stagnation by certain experiments which have recently been made in the Garjat States. There the Agency Inspector has limited admissions to the beginning of the year and to children of five or over, has been able to secure a second teacher for almost every school, and has been able to introduce more modern methods of teaching. The result has been the following change during the past five years in the distribution of pupils in 35 schools chosen at random from the area under his charge:—

	Class. I.	Class II.	Class III.	Class IV.
1	2	3	4	5
1922	685	185	134	112
1927	559	362	358	240

Oral Evidence.

67,195. *The Chairman*: Mr. Lambert, you are Officiating Director of Public Instruction in the Province of Bihar and Orissa?—Yes.

67,196. And you, Mr. Blair, are Deputy Director of Public Instruction?—Yes.

67,197. I understand that it is convenient that you, gentlemen, should be examined on the note of evidence provided for the Commission by Mr. Fawcus, who is Director of Public Instruction in the Province?—Yes.

67,198. I have had the advantage of being supplied with an advance copy of the Third Quinquennial Review of the Progress of Education in Bihar and Orissa. Is it proper to refer to that in public?—(*Mr. Lambert*): I understand that the Government Resolution has been passed upon it; so I think it is all right.

67,199. Do either of you wish, at this stage, to make any statement in addition to what appears in the note on which you are speaking, or to make any correction?—(*Mr. Lambert*): No, but the figures which are given for the experiment in the Banki Union are not the most recent figures.

67,200. I propose to bring them out of the Progress Report. I think they exist there?—There are some there, but even those are not the most recent.

67,201. Could you give us those?—I could not give them to you immediately. I am sorry to say that I have not got the exact figures.

with me at present, but I am expecting them from the Inspector of Schools, Orissa.

67,202. Perhaps you would let us have them at your convenience?—Yes, I will.*

67,203. Will you, first of all, tell the Commission a little more about adult education in the Province than appears in Mr. Fawcus's note. Is adult education conducted by your department?—Yes, adult education is conducted by our department. The schools are night schools mainly, giving a primary education. There are 802 schools and approximately 17,500 pupils. These figures apply to male education only.

67,204. Who teaches in the night schools?—The ordinary arrangement is that the primary school teacher teaches these people in his spare time.

67,205. Does he receive any extra remuneration for doing so?—Yes, he gets extra remuneration. He gets probably from two to five rupees a month in addition.

67,206. From the public funds?—Mainly from the public funds.

67,207. Does he also receive fees from those whom he teaches?—(*Mr. Blair*): I should think a very small amount. (*Mr. Lambert*): From my previous experience, I think the amount is negligible.

67,208. Can you give us some indication of how many of these schools are in rural areas and how many in urban areas?—I am sorry I cannot.

67,209. Can you give us no figures, Mr. Blair?—(*Mr. Blair*): Most of the night schools are in rural areas. I do not know of any night schools in urban areas, but I would not like to say that they do not exist. (*Mr. Lambert*): I would like to supplement that by saying that there must be some of these schools in industrial areas, because the review itself speaks of the supervision in industrial areas being very much better than in other areas, and I suppose the industrial areas are mainly urban.

67,210. Is it not a little surprising that these schools are in existence to a greater extent in rural than in urban areas? I should have thought the urban population more easy to attract to night schools for adult education?—Yes. I am very doubtful about that answer. I think myself that probably there are more night schools in urban than in rural areas. But my experience of that dates from about twelve years ago, when I was an Inspector of Schools.

67,211. How about the supervision of these adult schools?—The supervision is carried out by the ordinary departmental agency, the Sub-Inspectors of Schools, and over them of course the district Inspectors.

67,212. Do you form the view that, in the main, these night schools are in a healthy and active condition?—My personal view is that they are not.

67,213. Do you think they exist more on paper than in fact?—I think they exist, but I should not say that very much work was being done in them.

67,214. Do you know anything about the attendance figures?—I have not got the figures for attendance, the actual attendance as distinct from the roll number. The number on the rolls is approximately 17,500, but if you mean the actual attendance, I have no figures for that.

---

* *Vide* Appendix I.

67,215. People do not learn much from just being on the rolls?—No.

67,216. Do any females attend the adult education classes?—None whatever, I should imagine, in these schools which I have mentioned, but we have a separate adult education agency for females.

67,217. Is that a *purdah* school?—They are *purdah* schools, but more in the nature of a central gathering, where a few females come together and are taught by a peripatetic teacher.

67,218. The facts as regards female education in general are before the Commission. Do you regard female education as extremely important?—I regard it as very important, if we are ever to do anything in the way of extensive primary education; and naturally, coming from the West, I regard it as important.

67,219. Do you think it is likely that the rural population will make any substantial advance towards better education and what follows from it until female education is placed on a sounder footing?—A substantial advance might not be made without it, but a fair advance might be made without it.

67,220. Is the problem of the female teacher a difficult one in this Province?—Yes, it is. It is very difficult to get trained women teachers. The social customs are against their being trained, and if they are trained it is almost impossible to get them to accept appointments anywhere except in urban areas.

67,221. They would not go to the outlying villages?—They would not go and serve there. There is the difficulty of their quarters, and there is nobody to look after them unless they happen to be married, and then of course the husband is living on the wife.

67,222. In answer to Question 2, Mr. Fawcus tells us "It is proposed to open experimental agricultural classes at five middle schools and endeavours will be made to put to the best use school gardens of about a quarter of an acre in each case". Is the idea there to use a measure of agricultural experience as a means of conveying general education, or is it, rather, vocational training proper?—The idea is to make use of practical agricultural teaching as a means of helping on the ordinary school curriculum. It is not in any sense a vocational training experiment.

67,223. There is no attempt to teach small boys farming?—I cannot say that there is.

67,224. That is likely to prove a disappointment? The attempt to teach small boys to farm on vocational lines is unlikely to be successful?—I agree with that. I think that, at any rate in the higher stages, the boy who comes there does not come with the intention of returning to the land. (*Mr. Blair*): May I add that it is the attitude of the parents when they send the boys to school that they are sent there to learn to read and write and not to learn to farm. They say 'We will do the teaching of farming ourselves'. That is the attitude of most of the parents.

67,225. That seems to me eminently sound. Is there great demand for teaching of English amongst the rural population?—Everywhere, that has been my experience.

67,226. Is there any widespread public demand for compulsory education?—(*Mr. Lambert*): There is a non-official demand for compulsory primary education but I do not think that one can say that there is a widespread demand in the sense that the people themselves

desire it. I have no doubt whatever that a great many people do not wish to have their children sent to school compulsorily.

67,227. *Sir Henry Lawrence*: In how many areas has it been applied?—So far, in one municipal area at Ranchi and one rural area at Banki in the Cuttack district. We have also experiments in two rural areas in the Saran district, and three municipal and one rural experiment are under consideration still. Actually we have no real experience of more than one municipal area and one rural area.

67,228. The Act authorising compulsion has been in force for eight years?—I do not remember the exact date of the Act. It is probably about that.

67,229. *Professor Gangulee*: Is there any special officer watching these experiments?—The Inspector of Schools is in general charge of the experiments but a Sub-Inspector of Schools in that particular area is specially instructed to keep an eye on these experiments and to see that they are properly carried out.

67,230. *Sir Henry Lawrence*: The application of compulsion is at the discretion of local bodies?—Yes.

67,231. *Professor Gangulee*: Do you require the sanction of the Government?—It requires the sanction of the Government. Most of these experiments could not possibly be undertaken without additional funds, which Government have to provide.

67,232. *The Chairman*: Your attendance figures show the number of boys who actually joined the lowest class?—Yes.

67,233. That is really a very unreliable guide to the efficiency of primary education in the Province? Might it not be in the public interest that the figures published should be those in class III and that from year to year the rise or fall in that figure should be the measure of failure or success? Do you not think that, under existing conditions, there is a danger of increasing primary schools regardless of the factor of efficiency, and of the persons responsible congratulating themselves on the growing attendance figures?—I do not think we congratulate ourselves very much on these attendance figures in Class I. We realise that practically no education worth having is given to the student if he stops in that class.

67,234. Do you not think that the real state of affairs would be brought home to the public if you presented the figures under Class III rather than under Class I?—I think it would be better to emphasise the figures in class III.

67,235. In answer to Question 23 (*b*) Mr. Fawcus says: "This is not unnatural, because if compulsion is to be effective it must be possible to fine, without delay, those parents who do not send their children regularly to school, but in the Municipality of Ranchi I have found that the average time occupied by a case under the Primary Education Act is six months". I suppose the period refers to the time from the beginning of the proceedings up to the judgment?—Yes.

67,236. Are you suggesting any amendment of the Act or of the procedure?—Mr. Blair has dealt with this question (*Mr. Blair*): This refers to Ranchi which has been my headquarters for the last five years and I know something about the working of compulsion in schools there. We have managed to reduce this period very considerably by addressing the District Magistrate. I do not think there is any necessity to amend the Act in order to get the figure reduced. Things are very much better now than they were.

67,237. Mr. Fawcus presents us with some very remarkable achievements by the Agency Inspector effected by securing a second teacher

to almost every school. I suppose by zealous administration in several directions he has managed very substantially to improve the position in a group of primary schools. Are you at all familiar with the conditions in the locality referred to?—(*Mr. Lambert*): The locality is the Orissa Feudatory States. My headquarters are normally at Cuttack which is the headquarters of the Orissa Division. I have heard something about the experiments but nothing very detailed. I do not think the conditions there are very different from what they are in British India proper and the rest of the Province, but the Agency Inspector has a very much freer hand than the ordinary Inspector of Schools. He is working under the Political Agent for the States and the States would naturally allow experiments which it would be rather difficult to carry out in British India, as the control of primary education is more or less in the hands of district boards. I should point out as regards the Agency Inspector that he has a very much smaller charge than the average Inspector of Schools.

67,238. Are not those figures rather remarkable? In 1922, there were 685 in class I; in class II there was a drop to 185; in class III it came down to 134 and in class IV to 112. In 1927, the position had so far improved that 559 children came to class I, 362 to class II, 358 to class III and no less than 240 to class IV. Those are very remarkable figures?—They are remarkable figures but in Cuttack I have heard some complaints about it.

67,239. On what ground?—Because of the closing of some of these schools. It is not mentioned here but it is mentioned in the Quinquennial Review.

67,240. Does the objection come from parents who regard these schools rather as crêches than as a means of educating their children?—I do not think it comes from them. It comes from the educated public. Any diminution in the number of students and in the number of schools is looked upon as retrograde.

67,241. Do you regard it as retrograde?—Personally I do not. I regard higher education for a larger number of students as more important.

67,242. Would you conclude from the figures that on the whole these figures show a great advance?—Personally, I regard it as a great advance.

67,243. Do you agree, Mr. Blair:—(*Mr. Blair*): Certainly. That is what we should like to see in the rest of the Province and it would be well worth calling the attention of district boards to this matter.

67,244. This colossal wastage between Class I and Class II represents a pitiful waste of public funds, does it not?—It is bound to result in waste of money. (*Mr. Lambert*): In this connection there is a paragraph in the Quinquennial Review on page 60. It gives you further figures and they are complete figures. There has been a diminution in the total number of students.

67,245. Is it your view that boys who leave school between classes I and II enjoy any lasting advantage?—I do not see how they can; I cannot speak from experience because I have not sufficient knowledge of the people whose sons attend the primary schools. I cannot see how the education given in class I could be of any lasting benefit.

67,246. Is the co-operative movement supplying a certain stimulus towards education in the Province?—I regret to say that I can find very little trace of that. I have heard that in the Cuttack and Puri

districts the co-operative movement has assisted in maintaining a certain number of primary schools, but I fancy it is a very small number. I have no figures and can find nothing about it in the report. There is very little co-operation between the Co-operative Department and the Education Department.

67,247. Have you interested youself in the problem of educating the sons of well-to-do zamindars and other persons of means?—No, we have no school for that type of boy.

67,248. Do you think there is hope that some adaptation of the principle of the Public School in Great Britain, which might be suitable to local conditions, would achieve a happy result?—It is very largely a matter of psychology, is it not? You have to change the outlook of the boy, and whether you can do it in the course of six or eight years I do not know. But something certainly might be done in that way.

67,249. One assumes naturally that education would be paid for by the parents, and that the public funds should not be charged for the cost of such education?—I think perhaps other Provinces might be able to give a better answer to that question. There are schools at Ajmer and Raipur and other places where such education is given. Perhaps it is more for the sons of Ruling Chiefs and big zamindars.

67,250. I should like to know from you the exact position as regards compulsory education. Is it the case that that system has been introduced in four rural areas, namely Banki, Gopalganj, Maharaganj and Jamhor?—Yes; it has just been introduced in Jamhor.

67,251. In no other districts?—No; the experiment is recent in the Saran district, while it has only just commenced in the union in the Gaya district.

67,252. With regard to the Banki Union, have prosecutions of parents been effected for not sending their children to school?—Yes.

67,253. And what about the absentees, that is, boys who having attended have been removed?—I think these prosecutions would include those cases as well, but I cannot say for certain. In that connection I might say that a certain amount of leniency has been shown in that union in order that popular opinion may not be roused against the experiment, and that accounts for the comparatively small number (thirty-six) of prosecutions in a year.

67,254. *Professor Gangulee*: There were thirty-three in 1926, and thirty-six in 1927?—Yes: As I have already said the experiment is succeeding better than the figures which are given here would lead one to expect.

67,255. *The Chairman*: Are you satisfied with the text-books in use in primary schools in the rural areas?—(*Mr. Blair*): I cannot say that I have heard many complaints on the subject.

67,256. I would rather have your own views than the views of possible complainants?—As a matter of fact I have had really very little to do with primary education, because I have also been in charge of secondary schools and middle schools, and having had an area of five districts it has not been possible for me as an inspector to pay very much attention to primary schools. That question could better be answered by the District Inspector.

67,257. Upon whom does the duty fall of revising text-books from time to time?—Upon the Text-Book Committee which has its headquarters at Patna.

67,258. Is it a standing committee?—Yes.

67,259. Can you tell the Commission how long ago it is since the text-books in the primary system were reviewed?—(*Mr. Lambert*): They are continually being reviewed; and as regards the reviewing of the books themselves this is going on throughout the year.

67,260. Do you come across many cases in which unauthorised text-books are used in primary schools; that is to say, small text-books prepared by the local school-master and sold to the parents?—I should think there are very few cases of that sort.

67,261. I find that Chapter XIX of the Quinquennial Review* deals, in fact, almost entirely with the examination of books newly submitted to the committee. There is no suggestion of a review?—You are thinking of a review in what sense?

67,262. Is it not important that books which have been accepted in the past should again come under scrutiny?—The Text-Book Committee is supposed to consider whether the books already prescribed for use in schools are better or worse than those which have come before them recently and to recommend accordingly.

67,263. Do you not think that it would be worth while having a systematic scrutiny of the text-books already approved?—Yes.

67,264. *Sir Thomas Middleton*: On page 317 of Mr. Fawcus' note the figures of attendance are given. The conclusion drawn is that stagnation occurs mainly in class I and not in class IV. There is a very heavy drop in attendance between class I and class II, and that is to be expected. For every hundred who would join class I one finds about thirty in class II. Then apparently the class steadies down and in classes II and III you have a similar attendance; but then for every hundred joining class III about thirty-six only take class IV. The reason for the heavy drop in the first case is fairly obvious, but the reason is not quite so obvious in the second case. Why should there be such a heavy drop between class III and class IV?—Classes I, II and III are included in what are known as the lower primary schools; whereas classes IV and V are in the upper primary schools. Upper primary schools are more expensive than the lower primary schools. They give a higher education and naturally there are fewer upper primary schools as compared with the lower primary schools.

67,265. That explains the point; I did not know where the line between lower and upper primary was drawn, whether after class III or class IV?—Mr. Blair points out that the boy also becomes more useful to his parents after he has passed out of class III, and is therefore withdrawn from school more readily by his parents at that stage.

67,266. That was the answer that I expected to get because this reason has been given in other Provinces. But there is also a further reason in this Province, namely, that the first three classes are grouped together and the upper primary begins at the class IV stage?—Yes.

67,267. I presume the upper primary classes are IV and V and after that they are classed as middle school pupils?—Yes, and the high school stage commences from class VIII.

67,268. Can you tell me whether the Text-Book Committee is giving any attention to the incorporation of nature study lessons and country object lessons for scholars in the primary schools in classes I, II and III. In some vernacular text-books of another Province which I happen to know, there was at one time in the primers a rather carefully grouped series of lessons bearing on country life, and I understand that the text-books in that case have been regularly revised so that they are now comparatively satisfactory. I do not

* The third Quinquennial Review of the Progress of Education in Bihar and Orissa.

know whether there has been a regular revision in Bihar and Orissa, with the object of improving the text-books from the agricultural population's point of view?—There is a regular revision every year in the sense that the whole list is re-examined, but I do not think that there has been any attempt to make the text-books more suitable for the rural population. I cannot say that that has been the case.

67,269. *Mr. Calvert*: In the final paragraph of the Quinquennial Report it is pointed out that what is required in primary education is improvement rather than expansion. Is it the definite policy of the department to hold back expansion in the interests of improvement? Would you be prepared to stop opening new primary schools until you have improved the attendance in the existing primary schools?—You speak of the department, but I should explain that primary education is very largely in the hands of the district boards.

67,270. But you hold the money grip, do you not?—Yes, we do to some extent, but I do not think that Government would be prepared to go to the length of withholding funds in order to ensure improvement rather than expansion.

67,271. Would it be possible for you, in advising the distribution of grants, to bring more pressure on local boards to improve the existing schools rather than start more schools? Is that no part of your policy? —We certainly endeavour to impress that on the local boards, but as I say, the actual carrying out of the policy is more in the hands of the district boards than in the hands of the department. We do impress on them the importance of improving the existing schools rather than increasing the number of schools.

67,272. As you pay the piper you can call the tune to a large extent, can you not?—We ought to be able to do so.

67,273. Is any system of propaganda being carried out to popularise the idea of compulsory education?—I think the answer must be in the negative.

67,274. Is any persistent propaganda being carried on to popularise adult education?—I know of none.

67,275. It is also stated in the same final paragraph "For mass education we need more teachers and better teachers". Is the arrangement of 'more' before 'better' accidental, or is that the policy?—I think it is merely accidental, although we do want more teachers.

67,276. The improvement of the teacher is more important than the increase in the numbers?—It is.

67,277. At what stage would you say a boy attains comparatively lasting literacy; class IV or class V?—I would say at the end of class III. By literacy you mean the ability to read and write?

67,278. Yes, that he is able to read and write and is not likely to relapse to illiteracy?—He attains that stage at the end of class III. I would not say that he is likely to retain that literacy right through the whole of his life, but he retains it for a sufficiently long time.

67,279. Have you compared the number of boys passing into literacy with the normal mortality among literates in the Province? Can you say from year to year whether literacy is on the increase or decrease? —I do not think I can answer that. I have the figures for the total literacy; it is about five per cent.

But it is possible to have an annual check. The annual normal mortality among the literate classes can be ascertained, and from that the number relapsing into illiteracy can be worked out.

67,280. On the question of wastage between the elementary classes and the classes at which boys attain literacy, is it under discussion to

try any scheme of limiting the entrance to boys who are the sons of parents who are willing to guarantee attendance right through the *full school-going period?—We have not made any experiment of that kind; we have not discussed it; it is a new suggestion.*

67,281. Do you think it would be possible?—I think it would be.

67,282. You are probably aware that in the Punjab we have tried that system of compulsory education which is based on the "contracting in" principle?—I have heard about it.

67,283. In adult education are the text-books specially designed for adults or are they the same as those used for the usual elementary school?—Exactly the same books.

67,284. Do you think that that is wise in the interests of adult education?—Probably not.

67,285. Is there any test of literacy in the adult schools?—I do not think any formal test is held.

67,286. You have not tried literacy certificates?—No; we have never tried that.

67,287. Does your department work in close touch with the Public Health Department?—(*Mr. Blair*): We are in close touch with the Public Health Department in one respect, and that is the scheme for medical inspection of schools.

67,288. Are your teachers given facilities for learning the main principles of public health which the Public Health Department would like them to know?—One of the books is a book on hygiene, which was, I think, prescribed some years ago, probably in consultation with the Public Health Department.

67,289. I gather that the Public Health Department holds you partly responsible for the slow progress made in rural public health; without rural education you cannot improve public health?—Hygiene is on the curriculum; the trouble is to find teachers capable of teaching. (*Mr. Lambert*): I think the trouble lies more with the customs of the country; you may teach the principles but they will not be applied in practice.

67,290. They will learn the thing, but they will not believe in it?—I am afraid that is the position.

67,291. Can you give any idea of the class from which boys attending schools are drawn? Are they the actual cultivators, or are they the middleman class, shopkeepers, and so on?—Do you mean boys in the primary schools?

67,292. In the rural primary schools; are they from the labouring classes, cultivating classes, landowners or middlemen?—(*Mr. Blair*): The majority are from the labouring classes or cultivating classes. The small shopkeeper will send his boy to the local primary school if there is no other school in the neighbourhood; if there is a middle school in the neighbourhood he would rather send his boy there. Primary schools are generally attended by the cultivating class.

67,293. Is it found here that your shopkeeping classes, when they send their boys to school, do so with the definite idea of having a vocational value attached to the education?—I think they send them with the idea of getting sufficient education to assist the parent in his business.

67,294. They attach a vocational value to the education?—Yes.

67,295. Have you, here, a phenomenon which we find in other Provinces, a decline in literacy among the so-called literate classes? They seem to be concentrating now on college education and sending a

smaller and smaller proportion of their boys to primary schools?—The literate classes do not ordinarily send their boys to the primary schools. They get the boy taught at home until he reaches a certain stage (say class IV or class V) and then send him to the nearest middle or high school. I think I am right in saying that a very small proportion of the literate classes send their boys to the primary schools. (*Mr. Lambert*): That is, the more educated classes or the middle classes.

67,296. Actually you have funds spent on primary education, which, if they could be concentrated on the boys who are prepared to attend school up to the full course, would give you far better results?—These are boys who go to the middle school and the high school.

67,297. I am talking of the problem of wastage. Actually you have funds devoted to primary education which are largely wasted owing to the difficulty in keeping the boys at school; if you could concentrate these funds on schools where the parents would guarantee to keep their boys for the full school-going period, these funds would give you more valuable results?—They would.

67,298. Is that problem of wastage regarded as the most serious problem you have to deal with now, or is it a question of resigned acquiescence with a thing you cannot cure?—That is a problem we are endeavouring to tackle, probably on the lines adopted by the Inspector in the Agency tracts; that is, endeavouring to improve the primary school by adding to the number of teachers and so securing that a larger percentage of students entering the school will go on to class III at least.

67,299. Would you accept the idea that selective compulsion would actually save you money? You could save money by selecting the areas?—(*Mr. Blair*): It would depend on the number of areas.

67,300. If you confine the education to areas which are willing to accept compulsion you will get more literates per year at a less cost?—(*Mr. Lambert*): Yes, you would.

67,301. *Dr. Hyder*: As regards this problem of wastage, I would like to know what are the conditions on which you would recognise a primary school when it applies for a grant?—(*Mr. Blair*): The Sub-Inspector inspects the school and reports to the district board, and if he reports favourably the district board grants a stipend to the school. That is in the case of stipendiary schools. There are other schools which are under small committees, grant-in-aid schools. He would report similarly regarding these, and the district board would make the grant. There are schools which are board-managed schools, and the boards themselves see that their teachers are competent.

67,302. When there is this problem that in the majority of the schools in the rural areas there is only one teacher, cannot you, by changing the conditions of recognition, bring about a change for the better in the schools?—I should like to say that that is one of the causes of this preponderance in class I, the number of one-teacher schools, and the department has been bringing this to the notice of the district boards. But the district boards have ideas of their own, and I think I am right in saying that the majority of them prefer a larger number of one-teacher schools, in spite of this stagnation, to a smaller number of two-teacher schools.

67,303. Supposing you had to change the rules for the recognition of such schools, could you do it departmentally?—It could be done by saying that district boards will not be permitted to give grants to one-teacher schools.

67,304. Could you do it yourselves as a department?—Government could do that in their instructions to the district boards, but I am quite certain it would be met with a vehement protest, because there are sparsely populated areas where there is the difficulty of getting together a handful of boys, and to insist on two teachers in the lower primary schools would be most uneconomical. That is what the district boards say But in the thickly populated areas, I should think it might easily be laid down by Government, if they chose to do so, that no school other than a two-teacher school is to receive aid or is to be supported by the department.

67,305. *Babu A. P. Varma*: Is primary education free anywhere in the Province except in the district of Saran? If so, in what area?—In Ranchi Municipality you have free and compulsory primary education.

67,306. Is it compulsory and free combined?—Yes. The boys pay no fees.

67,307. How is the system working in Saran?—There they have only free education.

67,308. How is it working?—I have had no occasion to report on it, and I have no knowledge of that part of the country.

67,309. What is the difficulty in trying the same experiment elsewhere?—It reduces the income of the district boards, and consequently the amount which they can spend on schools; and it also means that the teachers have to be compensated for the loss of fees. (*Mr. Lambert*): Perhaps, I might say that the amount of the compensation would be twenty-five per cent more than Government give at present.

67,310. Could you say how many district boards are prepared to take up this free primary education, if the Government are prepared to co-operate with them?—(*Mr. Blair*): I think all the district boards have been told that Government are willing to consider schemes, and only in those areas that have been mentioned in the Quinquennial Report have they agreed to try it.

67,311. You mean all the district boards in the Province?—All must have been informed about it.

67,312. How many of them are prepared to do so?—I do not think Government are prepared to encourage this free education in any and every area.

67,313. Government are not prepared?—I do not think they are prepared to encourage the district boards to go in for it wholesale, on the grounds that I have stated, namely, the expense.

67,314. Are there district boards so prepared?—Government have told the district boards that they are prepared to sanction such schemes in selected areas, and that is why, in these union areas, these schemes have been sanctioned by Government. Government have not asked any district board to adopt this in its complete area, but Government have said that it is an interesting experiment, and they are prepared to consider its being tried in union areas within their jurisdiction.

67,315. It is left to the discretion of the department to suggest any area?—Yes.

67,316. In that case Government are prepared to help with funds?—Certainly. It is being tried in these four particular union areas.

67,317. *Sir James MacKenna*: What is the general attitude towards education in the Legislative Council? Is there much

enthusiasm for the spread of education and an increased expenditure on education?—(*Mr. Lambert*): They wish to see both a spread of education and an increase of expenditure on education.

67,318. Which do you think they would prefer, money spent on communications or money spent on education? Is there any very pronounced feeling on the point?—I think in the Council they would certainly prefer to see money spent on education.

67,319. In answer to Question 23 (*b*), the statement shows that you have teachers getting a maximum of ten rupees a month in the untrained teacher class. Is there any immediate prospect of an increase in their pay?—There is no immediate prospect of an increase, because we are endeavouring to work up to a scheme to provide education for eighty per cent. of the boys of school-going age in the Province. These rates of pay are to be given to teachers and we are, as far as possible, working up to this scheme.

67,320. *Sir Henry Lawrence*: What are the present rates of pay?—(*Mr. Lambert*): They vary from five to ten rupees for the untrained teacher, to twelve to seventeen rupees for the trained teacher in primary schools, with triennial increments of one rupee.

67,321. Can a man live on five rupees per month?—He cannot. (*Mr. Blair*): He does not live on five rupees a month alone; he gets fees and probably gifts of grain, and so on.

67,322. What will his total emoluments be?—Perhaps about ten to twelve rupees. (*Mr. Lambert*): The average is ten rupees eight annas; ten rupees in the rural areas, and it may run up to as high as eighteen in the municipal areas.

67,323. Including all emoluments?—Yes, except the occasional presents in kind; those would not be included in the figures.

67,324. Are they substantial?—(*Mr. Blair*): They vary, and the extraordinary thing is that it is very often no advantage to a teacher for the district board to raise his stipend, because, as soon as the stipend is raised by the district board, these gifts in kind cease. The people say "You are getting increased wages from the district board, and there is no need for us to give you anything." That is an unfortunate characteristic of rural education. There have been increases in their pay; higher rates have recently been sanctioned, but it is doubtful if the teachers have benefited much, for the reasons I have given.

67,325. *Dr. Hyder*: Does the teacher get his food twice a day at the houses of these pupils?—They pay the fees in kind, in grain, in rice.

67,326. He does not get his board from the pupils?—He probably lives at the house of one. Very often the *guru*, as he is called, lives in the house of one of the villagers, and he gets his food in return probably for small services like writing letters.

67,327. *Sir James MacKenna*: Approximately, it is very close to the old Scottish type of education hundreds of years ago; the "stickit minister" type of education?—But in the "stickit minister" type of education, the teacher did not get any food.

67,328. He got his bag of oatmeal, I think?—Yes, I believe he did.

67,329. *Sir Henry Lawrence*: Does the schoolmaster go round to take these gifts, or do they flow in automatically?—I am afraid sometimes he has to go round and press for them.

67,330. *Professor Gangulee*: Does he find time to do so?—Yes.

67,331. *Sir James MacKenna*: That was the policy. Are Government satisfied that with these rates of pay they can get an adequate number of teachers of the right type?—At present Government cannot afford to pay more, unless the district boards levy a cess for education purposes; and so far as our information goes, there is not a single district board prepared at present to levy this educational cess. (*Mr. Lambert*): We make no pretence that these rates of pay are adequate to secure the type of men we want.

67,332. *Professor Gangulee*: Under the present system, if the district boards desire to have primary education, they themselves draw up the scheme. Then what is the procedure? Do they submit their schemes to you?—(*Mr. Lambert*): Practically, the District Inspector draws up the scheme at the instigation of the district board. They were all asked, about three years ago, to draw up these schemes. The idea, as I have said, is to provide education for eighty per cent of the boys of school-going age. These schemes are sent in to Government, and they are then approved or modified by Government and returned to the district. An attempt is made to increase the funds supplied to the district board every year, until they can finance the scheme as laid down.

67,333. Who examines the schemes?—The Director of Public Instruction examines the schemes. Of course they are examined before that by the Inspector of Schools, sent up to the Director of Public Instruction, examined by him, and sent on to Government in the Ministry of Education.

67,334. How long do you take to examine these proposals?—When I was officiating here in 1924, I had to examine several of these proposals. It took me, off and on, perhaps ten days to a fortnight. They are complicated proposals. Along with the proposal there is a map showing where the schools are to be located, and it takes a long time to work through a scheme of that kind. I do not pretend, of course, that I had no other work during those ten days or a fortnight.

67,335. The maximum amount of time taken to examine a proposal may be taken as a month?—Yes.

67,336. Then what happens?—It goes up to Government. Government then return it with their comments and suggestions to the district board through the Director of Public Instruction. They may or may not accept it; there may be further correspondence.

67,337. How many proposals came to you, and how many of them did you reject because the schemes were not satisfactory, or because the district boards did not fulfil the conditions necessary?—I suppose there was not a single scheme on which we had no comment or suggestion to make; none were rejected, of course.

67,338. Comments there may be, but were any schemes totally rejected?—I do not think we could say that any were totally rejected. (*Mr. Blair*): I had some experience of the examination of these schemes, because two years ago I was put on special duty to examine twenty odd schemes which had been sent up by the department. That was after they had been sent by the Director of Public Instruction to Government. The general principles had been laid down. Government discussed them with the district boards and others interested and that took a long time but once these general principles were arrived at the examination of these schemes took no time at all. I was a long

time drafting the Resolution arriving at the general principles but the actual examination of the schemes took a very short time once you had arrived at the general principles.

67,339. These principles are known to the district boards?—These were made known by a Resolution issued in March 1926. (*Mr. Lambert*): That Resolution is here if you wish to see it.

67,340. Since these principles were laid down, the delay in passing a scheme through has been considerably reduced?—(*Mr. Blair*): There need be no delay at all.

67,341. How many such schemes are actually put in operation by the district boards?—All district boards sent in schemes and these were examined. Replies were sent and the schemes are in operation in all districts now. Unless more money is forthcoming it will not be possible to work out these schemes to the maximum.

67,342. I understood you to say that there is only one scheme working in the Banki Union?—(*Mr. Lambert*): I thought you were referring to the ordinary primary education schemes.

67,343. I am referring to the compulsory primary education scheme? —That we have working in one municipal and four rural areas.

67,344. The district boards are supposed to prepare the scheme?— In the rural areas, yes.

67,345. And submit the scheme to you for your approval and comments?—Yes.

67,346. What happens then?—It goes to Government who return the scheme with their comments. Usually it is a matter of finance.

67,347. How many such schemes, could you tell us, were actually drawn up by the district boards? I am trying to find out what interest the district boards take in this matter?—My information is, only about four schemes; one is regularly in operation; two are more or less recent and one has only just been put into operation.

67,348. There was a conference of chairmen of district boards some time ago. Did you make it clear at that conference that they should avail themselves of the Compulsory Education Acts?—I was not here at that time. (*Mr. Blair*): I was not here either.

67,349. Could you tell us whether any efforts were made on the part of Government to enlighten the chairmen of the district boards in the matter of introducing free primary education?—The chairmen of the district boards do not, I think, consider that they require education in these matters.

67,350. In the Banki Union you have an attendance officer. Who pays his salary?—(*Mr. Lambert*): Practically Government is financing the scheme at present. They promised to finance it for three years. Government pay the attendance officer indirectly through the district board. They give an additional grant to the district board in order to enable it to meet the expenditure on this experiment.

67,351. This attendance officer is on your staff?—He is employed by the district board. All our reports come from the district board and are to some extent checked by the Inspector of Schools.

67,352. Do you not think that it is advisable to fix a ratio of one teacher to twenty-five or thirty pupils?—You cannot expect a teacher to teach three classes properly. He will naturally concentrate on the top class. Naturally, the boys in class I are left to themselves and they pick up a certain amount of education; the *guru* does his best for them. I should here like to emphasise one point and that is that in

class I students stray in at all times of the year. Some have been for a whole year and some only a few months. For instance, some join only in October or November instead of in January.

67,353. Could you tell us what fees are charged for primary schools?—The fee charged for individual pupils is one anna or two annas, perhaps four annas if the man is rich.

67,354. Do you charge the depressed classes anything?—They are educated free. A special allowance is made to teachers in the depressed class schools something in the nature of a capitation grant.

67,355. As regards this question of compulsory education, do you think it would be advisable to appoint a special officer to go into the whole question?—Unless local bodies, municipalities and unions are prepared to charge an education cess, you can do almost nothing. We made a sort of estimate as to what it would cost to work up to this. If education is free, the cost comes to about a crore and forty lakhs. We have, however, since discovered that this must have been considerably underestimated. I think it would come to two crores for rural areas only.

67,356. Is there any objection shown to sending girls to boys' schools?—In rural areas there are a large number of girls attending boys' schools. It is rather astonishing but it is the case.

67,357. Do the girls follow the same curriculum as the boys?—The same curriculum, except that they do a little sewing. When inspecting primary schools, I have seen the pundits teaching sewing.

67,358. Are the text books in the rural areas the same as in urban areas?—They are the same.

67,359. In the matter of adult education, there is no supervision at all in the schools you mention?—No special supervision but the Sub-Inspector of Schools is supposed to keep an eye on those schools.

67,360. Do you follow the same text books as those used in primary schools?—Yes.

67,361. What should be the main object in adult education?—I am afraid that at this stage the only object is to teach the students to read and write. We make no attempt to impart vocational education.

67,362. In your view, the objective in adult education is to secure literacy?—That is what we are trying to do.

67,363. *Mr. Kamat*: The crux of this whole question of spreading education among the masses is the question of money?—Very largely. It is not only a question of money; we have great difficulty in finding the teachers.

67,364. Do the leaders of public opinion in this Province realise the broad fact that you are spending relatively more on collegiate education than on primary education?—Are we spending more on collegiate education?

67,365. I mean comparatively?—I take it that the leaders of public opinion read the reviews and the annual reports on education and other documents. I cannot say definitely, but I suppose they realise it.

67,366. If it is a fact that collegiate education is receiving more, does it not amount to this, that you are blocking the way for the welfare of those who receive primary education?—Yes, that is so.

67,367. Supposing you reduce, somewhat, the collegiate education expenditure, would you devote that to the improvement of existing

primary schools or to their expansion?—If the department had the handling of the money, I think we can say the department would devote it mainly to the improvement of existing primary schools. We should use it in some cases for expansion too.

67,368. What would you advise the district boards to do: to have more schools or improve the pay of the teachers?—I would advise them to improve the conditions in existing schools, to improve the pay of the teachers and to appoint more teachers in order that we may have at least two teachers in every primary school.

67,369. The second point which I would ask you about is this: Is it realised by the leaders of public opinion that what you are spending now on education, taking the population as compared with the population in other Provinces, is materially less owing to your system of assessment of land revenue?—I suppose they realise that to some extent but, as you know, there is a great agitation against the revenue from opium, revenue from liquor and so on.

67,370. Bombay, for instance, with a smaller population is spending three times as much on education as Bihar and Orissa?—Yes.

67,371. The land revenue there is five crores as compared with a land revenue of seventy-six lakhs here for an area of 83,000 square miles, as against an area of 124,000 square miles in Bombay. That is to say, Bombay raises three times more land revenue and spends it on the boys of the Province; the money goes back for the welfare of the boys of the Province. Is this realised by public leaders in this Province?—I am sorry I cannot speak for the leaders of public opinion in this Province.

67,372. *Mr. Calvert*: Could you give us, off-hand, a rough idea of the cost from public funds per head in primary, middle and high schools, and colleges?—I have made a note of the figures. The average annual cost per pupil from public funds in the arts colleges is Rs. 193; in professional colleges it is Rs. 439; in high schools Rs. 17; in middle schools Rs. 10; in primary schools Rs. 4. Then we have certain special schools such as the Hazaribagh Reformatory School and industrial schools, where the average expenditure from public funds is Rs. 71.

67,373. Really, this question of rural primary education becoming universal is not so much a matter of funds as it is one of the allocation of the funds that you already have?—I have got the figures for expenditure and if you will permit me I shall give them. The total expenditure on institutions for males is approximately Rs. 1,12,00,000; in arts colleges it is Rs. 9,75,000; in professional colleges it is Rs. 5,50,000; on secondary education the figure is Rs. 30,00,000, and on primary education Rs. 51,00,000. If you take the expenditure of Rs. 51,00,000 and add to it the expenditure on arts colleges, it will not raise it very much; it is only a question of another ten lakhs on the arts colleges.

67,374. If you were the dictator you could turn out a vastly greater number of literates in a year than is the case at present, if you had the money?—Yes, that hinges on the limitation in the number entering class I; that limitation would be arrived at by improving rather than expanding primary education, that is, improvement in the sense of appointing at least two school teachers in every school.

67,375. The main point is that the difficulties are not purely financial?—No; that they are not purely financial we must admit.

(*The witnesses withdrew.*)

APPENDIX.

Note regarding the Experiment in Compulsory Primary Education in the Banki Union of the Cuttack District.

There are fifteen lower primary schools in the area, with adequate equipment and accommodation for 80 per cent of the number of boys of school-going age in the area. Each school has two teachers, all except four of whom are trained. A census gave the number of boys of school-going age as 1,122—the provision is therefore for 898. Of this number 797 have now been enrolled, and the attendance is 712 or 88 per cent. The recurring Government grant towards the experiment is nearly Rs. 5,000 a year. The Inspector of Schools considers the scheme is working satisfactorily on the whole, but states that it would fail if compulsion were discontinued.

Messrs. H. Lambert and F. R. Blair.

Lt.-Col. W. C. ROSS, I.M.S., Director of Public Health, Bihar and Orissa.

[Lt.-Col. Ross was examined on the following replies to the Questionnaire submitted by Lt.-Col. J. A. S. Phillips, I.M.S., Offg. Director of Public Health, Bihar and Orissa, and on his own supplementary note.]

Replies to the Questionnaire.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*h*) AND QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) 1. The improvement of the sanitary condition of villages in rural areas is of the utmost importance, but little or no progress has been made in this direction so far.

It is too much to expect Local Governments to spend money on carrying out these improvements in all villages in the Province, and in the present state of ignorance and superstition of the inhabitants, their caste and other prejudices, their conservative ideas with regard to the origin of disease, their habits and customs, such improvements, if suggested, would not be welcome.

2. Progress must therefore be slow and help must come from the people themselves, and this can only be achieved by education. This education must not only aim at improving the social status of the people, however much this may be desirable, but should be directed towards bringing about an appreciation of communal responsibility with regard to the spread of infectious diseases, and the advantages to be gained by improved sanitation.

This education may be promoted in several ways:—

(*a*) The teaching of elementary hygiene in village schools.

(*b*) Propaganda work on market days.

(*c*) Health weeks.

(*d*) The erection of model villages at selected centres.

(*a*) *The teaching of elementary hygiene in primary schools in villages.*—The difficulty here is that the teachers themselves do not understand or appreciate sanitation. A way out of this difficulty would be to substitute the text books prescribed, by a book on elementary hygiene, where important sanitary principles are given in narrative form and such subjects as a good pure water supply, the advantages of clean and healthy surroundings, flies as agents in the dissemination of disease and their habits, the more important infectious diseases and how to avoid them, may be told in simple language. It is understood that such books exist, and the Personal Assistant to the Director of Public Health of this Province is now engaged in the preparation of such a book. It would require to be illustrated and prescribed for all primary schools, and would of course have to be written in the different languages and dialects of the Province.

(*b*) *Propaganda work on market days.*—A certain amount of this work is already being done, but more at large *melas* than at *hâts* or markets in villages. This ought to be a part of the work of the District Health schemes and every Health Inspector should be required to do it in the area he controls. Simple lectures, illustrated by charts and models, on general sanitation and infectious diseases, should be given at the more important *hâts* in his area.

(*c*) *Health weeks.*—These should be held at convenient centres in the district in the winter months, and at times when the villagers are more or less free from anxiety with regard to their crops. The district health staff should undertake all arrangements for these health weeks, and the Public Health Department might help with lectures, magic lantern, pamphlets, posters, etc., and if combined with agricultural shows where prizes would be awarded for exhibits, they would be popular.

(*d*) *The erection of model villages at selected centres.*—These should include a suitable type of hut on a good selected site and on an approved plan. The water supply should be specially considered and there should be a closed well with a pump. The district health staff should see that these model villages are looked after, and people desiring to occupy them should have to conform to any rules and regulations framed with regard to the sanitation of them. Health weeks should be held in the vicinity of these model villages so that people attending may be shown round them.

3. The awarding of prizes for the most sanitary village in a district might act as a stimulus to villagers, encourage a spirit of competition and rivalry, and result in improved conditions.

The prizes should take the form of something that will still further improve the sanitation of the best village—an improved water supply, for instance, a good road from the nearest high road to the village, a drainage scheme, improvements in their market arrangements, etc. The Sub-Divisional Officers should first pick out what they consider are the best villages in their sub-divisions, and a committee composed of the District Magistrate, Civil Surgeon and some of the leading zamindars should then examine these and award the prize to the one they consider the best.

4. It is suggested for consideration that Government loans (*taccavi*) should be conditional and that agriculturists taking advantage of this privilege should be called upon to clean up and keep clean the surroundings of their village, and to use their influence in persuading people in other villages to do the same.

5. The formation of co-operative health societies, on the lines of the co-operative anti-malarial societies of Bengal, where young men join together and carry out improvements round villages, such as the clearing of jungle, drains, insanitary tanks, wells, etc., co-operative societies where they exist should help in this movement.

The success of these movements depends on the men who are at the head of them, and the extent to which they can persuade others to help.

There are times when the agriculturists are not too busy to carry out such work, and if influential zamindars make an endeavour to collect volunteers at these times and set an example by being present themselves to supervise operations, some good could be done in this manner.

6. *Boy Scouts.*—An endeavour should be made to start this movement in rural areas, but instead of following the usual lines it should be directed against insanitary conditions round villages. It might almost be worth while to subsidise intelligent, keen and active school teachers to start this movement—the emoluments paid being dependent on the amount of work done.

7. *Union Boards.*—The scheme of including neighbouring villages in a union board might be developed and extended. It has immense possibilities, if properly organised and worked. As run at present the

boards steadily refuse to enforce any taxation, and are dependent on district boards for funds to carry out improvements. This is a mistake and, as the union boards have power to impose taxation, this power should be exercised and the money thus collected should be devoted to the improvement of the sanitation of villages in the union.

The clerk of such boards should be a qualified Sanitary Inspector or Health Inspector who, in addition to duties connected with the collection of taxes, the keeping of accounts of such monies collected and other clerical work, should be responsible for the sanitation of the villages in the union, and for disinfection of wells when cholera breaks out, for the early notification of the outbreak of infectious diseases and to advise the union board committee on the best manner in which funds collected by taxation should be spent in improving the general sanitation of the villages.

Supplementary Note by Lt.-Col. W. C. RCSS, I.M.S.

I only returned from long leave last month and after going through the papers, and the evidence prepared by my predecessor, I prepared the note submitted herewith, as, in my opinion, one aspect of the relationship between agriculture and public health has not been sufficiently considered in the evidence submitted by my department.

2. The population of Bihar and Orissa is 34,004,546 of whom at least two-thirds are infected with hookworm and about one-third are or have been infected with malaria. Epidemic influenza, cholera, small-pox and plague exercise a very heavy toll on the number and on the health of the population. Diseases such as hookworm and malaria especially, though they are not a frequent cause of death, have most serious effects upon the vitality and the physique of the population and exercise a profound influence upon its productive capacity and its prosperity.

3. In short, public health is essentially an economic problem.

The relationship between the economic condition of the people, the prevalence of epidemic diseases, and the birth-rate and mortality amongst the population, is intimate and definite, and each varies with the other. A high birth-rate may be a sign of prosperity and plenty, or it may be merely an accompaniment of a high death-rate and a reflex of primitive conditions and a struggle for existence.

Nature adjusts the balance of population and food supply by means of the death-rate and the birth-rate, and these are influenced primarily by the success or failure of the harvests. There is therefore an intimate relationship between public health and agriculture, and the betterment of the one must be accompanied by the improvement of the other if any real and permanent result is to obtain. This becomes more obvious when one considers that, in this Province, agriculture is the great national industry, and that the economic condition of the population is based upon the crops produced, and may be measured in terms of the harvest.

If we accept the general proposition that agriculture is the great national industry of this Province, and the only important source of its prosperity, if we admit that the prosperity of the people depends upon the agricultural productiveness of the Province, then we must look to improvements in agriculture to increase the prosperity of the people and to provide the means for improving their health.

Dean Swift has expressed similar ideas in "Gulliver's Travels." The King of Brobdignag gave his opinion to Gulliver that "whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country than the whole race of politicians put together".

4. The effects of malaria on the vitality and stamina of the population are far-reaching and wide-spread. The ordinary measures for the prevention of malaria, which may be summarised as the use of quinine, and the prevention of mosquito breeding by intensive work such as has been carried out so successfully in the Panama Canal zone, and elsewhere in localised areas, are not applicable on a grand scale over an extensive area, where the population is poor, ill-educated and not subject to discipline.

What is wanted is a policy of malarial prevention which will pay its own way, and can be carried out in conjunction with other work of a productive nature. The people might then be expected to take up such work individually in their own interest, and the collective results of work carried out by countless workers throughout the Province would be definite and more permanent. Further, such a policy would, at the same time, improve the economic condition and the prosperity of the people and would indirectly also reduce the prevalence of all epidemic diseases by making the people healthier and stronger.

Such a policy is possible; it is already being carried out in Italy and Spain. It consists in combining agricultural improvement with sanitation, by draining or flooding marshes and wet lands in a scientific manner so as to produce larger crops, at the same time as to prevent the breeding of mosquitoes and the spread of malaria. It also includes the cultivation of waste lands as far as possible and the intensive cultivation of good lands.

This policy is possible and it is productive. It improves the health and the prosperity of the people at the same time, and the more their health is improved the more land can be brought under cultivation and so the results are cumulative and progressive.

5. Public health is purchasable, and the people will obtain only the quantity and the quality for which they are prepared to pay. In other words, public health is fundamentally an economic problem and unless it is considered and dealt with as such there can be, and will be, little, if any real progress.

Extracted from Annual Public Health Report, Bihar and Orissa, 1921.

There are three essential factors to sanitary progress and the betterment of the public health, and these must act in unison and uniformly to produce definite and real improvement. These are:—

(1) Economic progress.

(2) Education of the poeple.

(3) Legislation.

Economic progress is essentially required to produce the means to meet the necessary expenditure. Incidentally it will also produce a demand for better conditions of living and well-being. The education of the people is needed to produce the understanding and appreciation of sanitary measures and of the principles which govern public health, which will eventuate in co-operation in ideas and in effort. Legislation is required to control and direct local administration and to provide the powers without which local bodies are helpless and ineffective.

Lt.-Col. W. C. Ross.

Of these three essentials, the greatest is the need for economic progress. If the produce of the land be increased, all else is possible, and unless this be done there may be much striving towards public health progress, but there can be no great or permanent advance.

6. "The initiative in all public health matters will usually rest with Governments, because there is no prospect of direct personal gain in such matters. The sad slow progress of public health is largely due to this, that it is "nobody's business" and that even Governments are apt to neglect its needs for some more popular political demand.

Extracted from Annual Public Health Report, Bihar and Orissa, 1923.

Inasmuch as a nation consists of its people, and its strength is based upon their health and prosperity, so it would appear that the chief duties of any Government are those dealing with the health and prosperity of its people.

In other words, economic and public health considerations and requirements are fundamental and inseparable, and must be dealt with accordingly. Admit this and base policy upon it. Press for legislative reform and education. Encourage economic prosperity by making " two blades of grass to grow where only one grew before ".

7. India is primarily and almost entirely an agricultural country in which industrialism is as yet in its infancy. The consideration of public health as an economic problem therefore becomes a problem in agriculture in which there are, in my opinion, two great fundamental difficulties which require to be overcome. These are ignorance and lack of credit. There is profound ignorance of modern scientific knowledge and improvements in agriculture, which is largely due to the fact that the peasant is uneducated and is unable to read English, which is the only available language in which such knowledge is available. His education is also so defective that his mind is prejudiced against change, and he is so poor as to be unable to spend much money on education or on attempts at improvement in agriculture.

The lack of credit facilities is an overwhelming obstacle to real and rapid progress. In the Indian village the *bania* is the only banker. His means are limited and his charges are exorbitant. Co-operative credit societies have made an attempt to deal with this problem, but such societies can only operate on a very small scale and they can only lend money which they borrow with difficulty and in small amounts. In my opinion a vast extension of banks and the banking system is essential, with a view to creating and diffusing credit throughout the country.

8. The educational problem is intimately associated both with public health and with agriculture, if progress is to be made in these and in this connection I would suggest that the present educational policy is top-heavy. There are too many Universities and too many graduates who are unable to find employment and who are ashamed to work. What is really required is a vast extension of good primary education, and the inclusion of English in primary schools, because English is the only available language in which knowledge of scientific progress can be obtained.

Oral Evidence.

67,376. *The Chairman*: Colonel Ross, you are Director of Public Health in Bihar and Orissa?—Yes.

67,377. I understand that it is agreeable to you that we should examine you on the note provided by Lieut.-Colonel J. A. S. Phillips,

and also upon your own supplementary note, which you have been good enough to prepare for the Commission?—Yes.

67,378. I take it that you are familiar also with the note* on Public Health and Medical Relief, which appears on page 22 in the Memorandum on Rural Conditions in Bihar and Orissa, prepared for the Commission? Did you prepare that note?—No.

67,379. Colonel Phillips, in his note, leads off by a statement that little or no progress has been made in the direction of improving the sanitary conditions of villages. I notice from the note in the provincial memorandum that hookworm is a very prevalent disease in the Province. Apart from that, what water-borne diseases press most heavily upon the rural population?—Dysentery, enteric fever and cholera, the last-named being very prevalent in this Province.

67,380. Is infection from wells very common?—That is a matter of opinion. I am inclined to think that wells are not really so usual a means of transmission as they were originally suspected to be.

67,381. Do you have step wells in the Province, that is to say, wells, the water in which is reached by the person going down a flight of steps?—No.

67,382. Are the wells in the rural areas or villages, as a rule, provided with rims which prevent the water spilt from the pails and also drainage water round about, from running back into the well?—No.

67,383. Would that not be an advantage?—Yes; that is one of the things which we have been pressing for a long time, but it is difficult to enforce it. We have great trouble in introducing this simple improvement, even in municipalities which are under legislative control.

67,384. Who opposes you?—It is the people who have to pay for it. They do not want to spend money on what they do not consider worth spending money on.

67,385. They do not believe that disease comes from water?—They do not see the direct connection; when they have not got the disease they do not seem to bother about it.

67,386. Might it be a good beginning to insist that where well-heads are being repaired, the improved pattern should be adopted?—Yes; we have been recommending that and trying to push it for the past twenty years, but with very little success so far. The trouble is to enforce it. One could recommend, and one might even legislate to that effect, but it would be almost impossible to see it carried out in the villages; the people in the villages would not make any alteration.

67,387. You have been pushing it for twenty years?—Yes.

67,388. What about the calibre of the men in your district staff?—I think it is satisfactory.

67,389. Do you find that the Indian trained in Western medicine has complete faith in it?—It is very difficult to answer that question; I do not think that you could give an absolute reply to a question like that.

67,390. Let me put it in another way. Do you find that, on occasions, experiments are made with the indigenous system by officers trained in Western medicine?—Yes, but that would apply more to the lower grades of the trained medical officers, that is to say the Sub-Assistant Surgeon class only. There is a great difference between the Assistant Surgeon class and the Sub-Assistant Surgeon class.

* Not re-printed.

67,391. The better trained men are not inclined to experiment with unauthorised systems?—No.

67,392. Colonel Phillips gives us, in answer to Question 17 (h) and 25 (*a*), some information about the propaganda work that has been carried out on market days. Has any good result come from that?—It is very difficult to measure results of that nature, but I think that some effect certainly has been produced.

67,393. Has it ever occurred to you that good pictorial propaganda persisted in through the years on public buildings, on railway platforms, and in market places, not once or twice, but time and again, might create a body of public opinion that would be better informed in these matters?—We have tried that. We have prepared a certain number of posters, illustrated as well as unillustrated, which have been circulated all over the Province.

67,394. What do you regard as the best poster that you have shown? Would you describe it quite shortly?—The most effective pictorial poster is probably that which represents a severe attack of small-pox.

67,395. Very well; take that poster: When was it produced?—It must have been produced about five years ago.

67,396. Where has it been exhibited?—All over the Province by now. I do not mean to say, in every village of the Province, but at separate places all over the Province.

67,397. Has it ever appeared on railway platforms?—No.

67,398. Are not the people travelling over the railways the very people most likely to bring infection into the Province?—Yes, but that point hardly arises, because we have the infection in large quantities in the Province itself and we do not really need to import any supplies from outside.

67,399. But do you not think that a railway station is a good place at which to put up a poster of that sort?—Yes, it is, but the trouble that we would be up against would be that the Railway Company would want us to pay for space.

67,400. Has it been exhibited at police stations?—That picture has not been. The script posters have been issued to all schools, police stations, hospitals, dispensaries, and public buildings of all sorts; but the pictorial one has not been issued on that scale; it is used in connection with lectures.

67,401. Which do you regard as more effective among an illiterate population: written posters or pictorial posters?—I do not honestly think that either of them is much use.

67,402. I suggest that the pictorial poster has not been given a good chance?—It has not been given as good a chance as the written one.

67,403. On page 336 of Colonel Phillips' note, he deals with the notion of erecting a model village to act as an example to the neighbourhood. Who is going to pay for those villages? Have you any idea?—I presume the intention of this note is that Government should pay.

67,404. Turning to your own note: You say: "What is wanted is a policy of malarial prevention which will pay its own way, and can be carried out in conjunction with other work of a productive nature". You cite the instances of Italy and Spain. Is it in your view possible in a typical malarial tract in this Province, having regard to the economic possibilities of the situation, to conduct a successful anti-malarial campaign by drainage?—It is not only by drainage; drainage is only one of the things; it is a question of combining intensive

agriculture with a certain amount of drainage and, very often, with irrigation.

67,405. But could the system, with which you are familiar in Italy, and which leads to a large accretion in the amount of land available for agriculture, be adopted in this Province?—Yes.

67,406. Are you satisfied that the conditions in which that particular scheme of development has been so successfully practised in Italy exist in Bihar and Orissa?—They certainly exist in some places; I am not prepared to say that they exist all over the Province.

67,407. I am not trying to throw cold water on your proposal, but I would be glad to see some constructive proposal; I would like to know whether you have brought the thing down to rupees?—I have not; that is an engineering and agricultural question and not a public health one.

67,408. What about the state of the hospitals in this Province to-day? Are you satisfied with them?—That is outside my department.

67,409. I will put it this way. Are there hospitals available for the rural population?—There are dispensaries, not hospitals. There are a few hospitals, but there are many dispensaries. A dispensary is different from a hospital; it is only manned by a Sub-Assistant Surgeon in the first place instead of by a superior medical officer.

67,410. The answer is that there are very few hospitals available for the rural population?—Yes, very few hospitals.

67,411. Are more hospitals being made available for the rural population during recent years?—The number has not changed much.

67,412. Do you think the rural population would greatly benefit if the members of the rural community received treatment in hospitals when they required it?—Certainly.

67,413. Do you think there will be any hope in attempting the institution of rural hospitals on co-operative lines?—I could not answer that question, because I have not gone into that. But the business of creating and staffing hospitals is a very expensive business. It is doubtful if it would be feasible to obtain sufficient funds on co-operative lines.

67,414. What do you think would be the lowest charge per bed per annum in a rural hospital which would give, at any rate, reasonably good nursing?—I could not answer that; I have not experience of hospital administration.

67,415. You told us in your last answer that it would be very expensive? What makes you think it would be very expensive?—Because you require large buildings to start with, and you require a considerable permanent staff who would all require to be paid. In rural areas you could not get honorary medical men; you would have to pay the entire medical staff as well as the subordinate staff.

67,416. I am not thinking of a big building, with a top storey and a radium room; I am thinking of quite a humble building sufficient to keep off the sun and the rain from these unhappy people, and the provision of reasonably good nursing and probably the advice of the nearest subordinate officer of your department when his advice is available. Even that would be a great advance on the existing conditions?—No; we want something more than that.

67,417. You do not think that would make any material improvement in the conditions of patients suffering from various dieases in rural areas?—I think the answer to that would entirely depend on

the question of what medical staff you have in charge of the hospital; a hospital without a competent medical staff would be of no use.

67,418. Whose duty is it to survey the possibility of multiplying these rural hospitals?—That would come under the purview of the Inspector General of Civil Hospitals.

67,419. Does the Inspector General of Civil Hospitals look after the few hospitals at present existing in rural areas?—He has supervising charge of all hospitals in the Province.

67,420. Are you in touch with that officer?—I am in touch with him.

67,421. So far as you know, no attempt has been made to work out, even roughly, the charge of providing on quite a humble scale any substantial increase in the number of hospitals available for the rural population?—Within the last four years there has been a scheme worked out for making a large number of dispensaries available; but I draw a distinction between dispensaries and hospitals. A dispensary has no beds in it, for one thing.

67,422. How are the vital statistics moving from year to year in this Province. Is the death rate shifting?—The death rate has gone down very little. I have been over twenty years in the Public Health Department; the death rate has gone down appreciably during that time, but not a great deal. I think it has gone down by three per mille.

67,423. How about infant mortality?—Infant mortality has been reduced appreciably.

67,424. *The Raja of Parlakimedi*: Are you in touch with district boards and municipalities?—Yes.

67,425. To what extent?—It is rather difficult to answer a question in that form. We inspect them from the public health point of view and send our reports; we advise them about water-supply and drainage schemes. They do not always take the advice, but they get it when they apply for it. And they are inspected regularly once a year.

67,426. Do they ask for your advice regularly?—They frequently do; for schemes of water-supply and drainage they do regularly, and for other matters occasionally.

67,427. Have you any control over their upkeep of drinking ponds and drinking wells?—We have no executive control; the only control that we have is in the inspection reports and the advice we give them from time to time. We issue a certain number of circulars and posters every year advising them about water-supplies and various other public health measures.

67,428. Have they not to get your sanction when they are about to excavate drinking water wells?—For wells, no; for water-supply schemes, yes; when they distribute it in pipes they have to come for sanction.

67,429. As regards drinking wells, can you condemn any that you consider unhealthy?—Yes; many are unfit, but it is no use condemning them as there is no alternative water-supply.

67,430. They do not act on your advice to improve the wells?—They do not immediately do so, but they usually try to do something in the direction which we have indicated.

67,431. How do you find their present attitude as regards taking your advice? Has it been improving?—No, I do not think it has been improving.

67,432. On page 336, speaking about health weeks, Mr. Phillips says "These should be held at convenient centres in the district". Are any health weeks at all held in the Province, and if so in what centres?—The only health weeks we have had have been baby weeks, which have been held in towns like Patna and a few other large towns in the three preceding years.

67,433. Is it an annual engagement?—No, it is not an annual engagement. It is a thing that originated at Delhi, and they asked the Provincial Governments to carry out the same sort of work, and we made an attempt to do so.

67,434. Has it been held only in Patna and nowhere else?—At Patna, Ranchi and some other places. I cannot tell you the exact names of all the towns, but it was held in several of the large towns in the Province.

67,435. Have the municipalities been taking any interest in what they saw at these health weeks?—I do not think they have made much impression. They may have, but I have not noticed it.

67,436. In your tours you have not observed whether any baby homes have been opened?—Nothing of that sort has been done.

67,437. Are they not even interested in supplying proper milk to poor children?—No.

67,438. *Sir James MacKenna*: Have you a Sanitary Engineer in this Province?—Yes.

67,439. Is he attached to your department?—Yes, to some extent. He is called the Superintending Engineer, Public Health Department. He does not work directly under me; he is more or less independent.

67,440. Still, I suppose schemes for water supply, etcetera, are worked out between the two of you?—Yes.

67,441. Have you any facilities for research in the Province?—Yes, I have a laboratory in the Medical College, in which I have both chemical and bacteriological work going on.

67,442. On what particular subjects are you working at present?—Cholera and *kala-azar*.

67,443. Do you get any help from the Medical Research Fund?—I have never asked for it, because I was able to get all the funds that I required from my Minister.

67,444. The attitude of the Legislative Council to public health is favourable?—Yes.

67,445. There is a keen public interest?—I would not say keen but at any rate they are sufficiently enthusiastic to be prepared to provide funds, as a rule, for any proposal.

67,446. *Professor Gangulee*: How many assistants do you have in the Public Health Institute?—There is a permanent staff of two and a variable staff according to the work that is going on, which may be as many as five.

67,447. Are they all engaged in routine work, or is any fundamental research being carried on?—I have been away for eighteen months on leave, and I have only just now come back. Two years before I left we were carrying on research work on bacteriophage in cholera, and on *kala-azar* transmission. That work was interrupted to a large extent when I went on leave, and it is just beginning again now; I have taken on two men now.

67,448. Similar work is being done in the School of Tropical Medicine in Calcutta. Are you working in collaboration with that institution?—They are working on different lines entirely.

67,449. They are working on cholera?—Yes, they are working on cholera and on *kala-azar* too.

67,450. Is there any research going on in the Province connected with the diet of the people?—There is no such research going on.

67,451. What is your view of the diet of the average cultivator? Have you made any enquiries?—I have sent to press a note which has been prepared on the subject of food and health, in which there are very definite views expressed on the question of diet.

67,452. Do the people in this Province suffer from deficiency diseases?—Yes, certainly.

67,453. What deficiency diseases have you actually observed?—The chief observation that I have made was that they suffer from a complete upset in the normal digestive processes. As regards fermentation in the intestine, it is due to the badly balanced diet, which consists far too largely of plain boiled rice.

67,454. Do you consider that milk is a very important constituent of the diet?—Yes.

67,455. Is there any Public Health Act in the Province?—I regret to say there is not.

67,456. Do you think the time has come for such a measure?—I certainly think that a Public Health Act is one of the most necessary things in India at present.

67,457. The initiative in all public health matters, you say, will usually rest with Governments. That is true in every country, even in the most advanced countries?—Yes.

67,458. And therefore, if any such legislation is considered necessary for the country, the initiative must come from the Government?—Yes.

67,459. You state three essential factors that are necessary to sanitary progress, economic progress, education of the people, and legislation, and you say that these three factors must act in unison. Which would come first? Legislation first, then education and economic progress, or would you wait till the people are economically advanced and educated and then have legislation?—That is a very difficult question to answer, but I think there is an important point on that which arises from the analogy of the development of public health legislation in England.

67,460. Precisely. I hope you will explain that to us?—In England, public health legislation practically took its origin about fifty years ago in the English Public Health Act; that was the first legislation of importance, and before that there was no Public Health Act. The position with regard to public health in England now is very advanced indeed, and a great deal of progress has been made. All that progress has been made within forty years, because for the first ten years the Public Health Act was an absolute failure in England. In fact a number of people wished that the Public Health Act should be repealed, because the work was having no results, and the only apparent achievement was one of expenditure without any benefit. After those ten years of probation were passed, improvement began, it steadily increased, and it has now produced extraordinarily good results. The point of importance is that legislation was not enforced, in fact legislation was not carried out until after a period of economic prosperity in England. There was a period of economic prosperity, a wave of industrialism in

England just before that, which provided the means; then came legislation, and last of all we had the general spread of free and compulsory education, which came last of all.

67,461. Nevertheless, the initiative had to come from Government?—Yes, subject to public pressure. The difference is that in England we have public pressure which will affect Government, but here public pressure is not what it is in England now.

67,462. On the question of bonification, is it your idea that the whole scheme should be financed by Government?—Certainly not.

67,463. With the help of the public?—I think any question of land improvement, which is to produce revenue and which is to increase the value of land, should naturally be financed by the persons directly concerned, who are the owners and cultivators of the land.

67,464. Speaking of bonification, you refer to recent work in Italy. There the scheme was carried on by landlords with the help of the State?—Yes, with the help of the State, but the State does not have to pay for the whole cost.

67,465. I thought you would approve of a subsidy from the State?—I would certainly approve of State help.

67,466. You have a medical school here?—Yes.

67,467. Do you find a tendency amongst the graduates coming out of the medical school to go into the rural areas and practise there?—I regret there is no such tendency.

67,468. Can you suggest how one could attract these men into the village areas?—I did make a suggestion to Government about subsidising appointments with a view to persuading competent medical officers to accept appointments and practise out in the country, but that has not so far been accepted.

67,469. That is done in Madras?—I do not know.

67,470. *Mr. Kamat*: Speaking about step wells, have you considered if it is possible to induce local bodies, district boards, to frame rules to the effect that there should be a parapet wall when people build wells?—Model rules of that sort have already been issued, but there is a great deal of difference between drafting and issuing model rules, and having them carried out; that is the trouble.

67,471. Do you suggest that the district boards are unwilling to enforce these rules?—What I suggest is that there is practical difficulty, due to inertia, not only on the part of the district boards but on the part of the people in the villages who are directly concerned.

67,472. The people in the villages may be unwilling, but in their own interest it is somebody's business to enforce these rules, and if that had been done during the last ten years, probably things would have improved. I want to locate where this inertia, this apathy to enforce rules, lies?—I think it is more or less reasonable to say that it is almost universal. I do not think it rests in one particular spot only.

67,473. Is not your department doing anything to stimulate or draw the attention of the local boards to this apathy?—We do our best, but the Department of Public Health has no executive authority. That has always been one of our difficulties, that we are in a position to tell the people what they ought to do, but we have no power whatever to make them do it.

67,474. Is there any method? If you cannot do it by educating public opinion, could you do it by legislation?—It is certainly possible to legislate, but whether it is possible to achieve the result by legislation is a very open question.

67,475. You gave an interesting history of the Public Health Act in England. About what time did the Compulsory Education Act come into force in England?—That was about 1880.

67,476. I think it was about 1871, in the seventies and not in the eighties?—That was the first Act. I am referring to later legislation.

67,477. You are referring to the later amendments?—Yes.

67,478. Did they have a Compulsory Education Act first or a Health Act first?—I do not remember the exact dates. The point of importance is that the Act was carried out and applied on a much larger scale than the Education Act to begin with. Education was only made free and compulsory universally somewhere about 1880, whereas public health began sooner.

67,479. *Professor Gangulee*: The date of the Royal Sanitary Commission was 1869?—I am not good at dates. It was somewhere about that.

67,480. *Mr. Kamat*: The economic progress of the people came first? The Health Act came fifty years after the economic progress?—It was not until long after the Napoleonic Wars that there was any improvement in the industrial position in England.

67,481. History shows that economic progress, literacy and appreciation of hygiene take time and have a certain order to follow?—I agree that it takes time but I do not agree that if there is a particular order in a country, every other country must proceed in that particular order. I think it is possible to take advantage of the experience of other countries in order to shorten the period or to arrange the order better.

67,482. I do not mean that every country should take exactly the same interval. What I mean is that the country should be ripe for it generally?—Certainly.

67,483. People are not appreciating the efforts of your department because there is not enough literacy in the country?—Yes, that is one very important reason.

67,484. In this connection I should like to ask you whether you have closely studied the social customs of the people of this Province which have a bearing on hygiene?—I have been in this Province all my service, for nearly twenty-five years, and have done a great deal of touring during that time.

67,485. Are there certain social customs bearing especially on personal hygiene, particularly, among the so-called higher communities, Brahmins, for instance, which are really good?—Do you refer to food arrangements, sanitary arrangement or what?

67,486. I shall illustrate my point. Probably you may have noticed if you have studied the social customs of the Brahmins that they will not eat or drink anything in the morning without first rinsing their mouth, that they will not eat food until they have bathed, and that they will not eat food prepared by a *khansama* who may look well dressed but who has not washed himself for eight days?—I have studied them to some extent. I am not as intimately acquainted with them as an Indian might be or ought to be.

67,487. Now, these are universal customs?—They are not universal in the population.

67,488. They were universal in the country, at least so far as the higher castes were concerned. I wonder what methods of publicity they adopted in the old days for universalising such customs in domestic life?—As far as one can gather, most of the customs have been inculcated in the people by the priests.

67,489. I am coming to that point. Religion was utilised to universalise these things. Yesterday we were told in this room that the assistance of the *pundits* was taken by the Veterinary Department in order to popularise one good method of inoculating cattle. I wonder whether you have also brought into requisition such leaders of public opinion, as *gurus* and *pundits*, to popularise the methods of hygiene?—It has only been tried so far as teaching in schools is concerned. It has not been tried outside the schools.

67,490. I want to know whether, in spite of these posters and other means, you are exhausting all avenues?—I should think it is highly improbable that we should be able to exhaust all methods of propaganda because I do not suppose any one man can do that. We have been trying to achieve a certain amount of results by propaganda work.

67,491. *The Chairman*: Is it possible to analyse the vital statistics as between various classes of the population?—It has been done to some extent. All these figures are available in the Census and the annual Public Health Reports, as far as they have been analysed.

67,492. How does the result of this analysis bear upon the general trend of my colleague Mr. Kamat's cross-examination? Does it show a lower incidence of mortality from zymotic diseases amongst the high caste members of society?—They are not given separately by caste. We separate them by religion. The Hindu religion covers a tremendous number of castes, so that one cannot rely on the figures.

67,493. *Mr. Danby*: In the rural areas where there are no hospitals, do you think it would be of benefit to the people if rooms were added to a dispensary where people could get some kind of treatment or nursing?—Not under the existing arrangements of medical control. The medical staff of these dispensaries is not of a class which is capable of doing much good to in-patients.

67,494. I mean, rooms where they could get dressings and that sort of thing?—You do not need rooms for that. It is only in serious cases that you want them. As I say, the staff in charge of these dispensaries is not competent to handle such cases.

67,495. *Dr. Hyder*: You say that cholera prevails to a large extent in Bihar and Orissa. Does it break out in any particular season?—It varies in different parts of this Province, because this Province has got different climatic conditions in different parts.

67,496. Does the source of infection come from the water supply?—In some cases, but not in the majority.

67,497. Do you not think it would be a good thing, at the beginning of the season when these attacks take place, to use permanganate of potash?—That is done on a large scale as a preventive measure.

67,498. With what results?—It is difficult to say, because sometimes the disease is definitely water-borne and at other times it is almost certain that it is not. When it is water-borne, if you are dealing with an infected well, you get good results. If you are not dealing with an infected well, you do not.

67,499. Does the water in the rivers get contaminated?—It gets contaminated, undoubtedly, but it has an extraordinary power of natural disinfection.

67,500. You have travelled in Europe?—Yes, to some extent.

67,501. You might have come across, on the continent, some cities where they have a central source of milk supply. It is open to anybody to keep cows but they must bring the milk to a place where it is analysed as regards tuberculosis and other diseases. Could you, in Patna or in

the cantonment area of Dinapore, make a beginning and see whether milk could be brought to a central place from which it might be distributed to the centres round about?—I certainly think that that would be an excellent way of controlling the milk supply.

67,502. *Sir Thomas Middleton*: You mean after pasteurisation?—I do not know whether that would be feasible, but a central collecting agency and the supervision of the distribution would make a colossal difference to the present conditions. At present the milk supply of this country is disgraceful; it is adulterated to the last limit with dirty water and all sorts of things. If you had a central distributing centre in every town you could control adulteration to some extent.

67,503. *The Chairman*: Is adulteration with cow urine common in these parts?—I have not seen it.

67,504. *Professor Gangulee*: Is it a fact that pasteurisation affects the composition of the milk and kills a certain amount of the vitamin properties?—It probably affects it to some extent but I am unable to say to what extent.

67,505. *The Chairman*: Do you think a proper control of the course of distribution of milk would ordinarily suffice, or do you contemplate pasteurisation also?—I think pasteurisation is only feasible in a large city like Calcutta under existing conditions. What we should really like to achieve in towns like Patna, Cuttack and other *mofussil* towns is to have the milk collected and examined by a competent officer and distributed through licensed vendors who would be able to take it round in sealed cans. The milk supply would, in that case, be infinitely better than the present supply. It would not be possible to pasteurise unless it was possible to erect a plant for doing so. If that could be done, it would certainly be better.

(*The witness withdrew.*)

Mr. D. R. SETHI, M.A., B.Sc. (Edin.), I.A.S., Deputy Director of Agriculture, Orissa Range.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) Agricultural development, including research, has not made the same progress in this Province as in some others owing to insufficiency of staff. The expansion of the department is a matter of urgent necessity. Each distinct agricultural tract in the Province should be provided with adequate staff to deal with the local problems as these cannot be handled at any one centre of the Province. The responsibility for the investigation of agricultural probems must be provincial. The Imperial Department should, however, deal with problems of All-India importance and especially with research on problems involved in the production of quality crops such as tobacco, fruit, drying of vegetables, etc., the improvement of which requires investigations along special lines.

We have to study the scientific value of the indigenous theory and traditional methods of agriculture in so far as these relate to the work in hand. Apart from this, hardly anything more can be done in this direction. Insufficiency of staff and funds are the two great obstacles in achieving marked progress in agricultural research. The removal of these obstacles would enable the department to achieve great progress in such directions as (1) popularising the use of manures, (2) improving

four major crops such as rice, sugarcane, etc., (3) storage of surplus rain water, (4) drainage of low lands for sugarcane cultivation, (5) designing and introducing improved implements and irrigation appliances, (6) testing and adapting small plants for *gur* manufacture and oil pressing, (7) breeding and feeding of fish.

QUESTION 2.—AGRICULTURAL EDUCATION.—(i) Owing to the absence of a provincial agricultural college, the training of the subordinate staff of the department is undertaken by the Deputy Directors in addition to their other duties. This work takes away a considerable amount of the time of these officers which should really be spent in the discharge of their legitimate duties and is therefore an obstacle to progress. The re-starting of the college is therefore desirable.

(v). The main incentive which induces boys to study agriculture at the agricultural colleges is the hope of getting Government employment.

(vi) In the past the pupils have rarely been drawn from the cultivating classes.

The spread of elementary general education amongst the masses is most urgently needed. Without this no progress in the economic development of India is possible. The courses of study suited to the requirements of the children of agriculturists will have to be drawn up very carefully. In the primary stages the teaching of elementary nature study should be included in the curriculum. In the rural middle vernacular schools agriculture should be one of the subjects taught in order to give the students a bias towards farming as a profession. The details of the curricula suited to the rural primary and middle vernacular schools is a matter for the experts, but when drawing up any scheme for the education of the children of agriculturists the one thing that must be guarded against is the type of education which alienates young men from the land and which creates a desire in their minds to seek jobs and thus swell the ranks of the unemployed. In this connection a great deal depends upon the teachers of the rural primary and middle vernacular schools as these have to mould the young minds to rural ideas. The teachers for these schools should, therefore, be specially trained and, so far as is possible, should be drawn from the agricultural classes.

The need for school plots and school farms is obvious if the teaching of agriculture in rural middle vernacular schools is to be of any use. Each rural vernacular middle school should have a school plot attached to it where boys can get practical training in the use of implements and manures and the growing of crops on a field scale. Recently Government have sanctioned the opening of school plots as an experiment in one selected rural middle school in each division of the Province. In my opinion the proposed size of these plots, a quarter of an acre, is too small.

(ix) The majority of students who have studied agriculture have either been provided for in the Agricultural Department or in other departments of Government. I do not know of any instance where a student who was unable to get employment has gone back to the land and started farming.

(x) Agriculture can be made attractive to middle class youths by (1) increasing the attractions of village life by improving communications, sanitation and the standard of living; (2) by the provision of suitable institutions which will turn out men who will take to agriculture as a vocation; (3) by establishing model farms of suitable size, run on a business basis, proving to the educated middle class youths that a decent living can be made out of farming: and (4) by the provision of

suitable facilities by Government for young men of moderate means who wish to start farming on their own account. These facilities can take the form of providing land on suitable terms, financial help on moderate rates of interest and appointment of an experienced officer who will give necessary advice and help to young inexperienced men in order to make their undertaking a success.

(xii) Practical instruction by demonstration is the best way of educating the cultivator. In our humble way we have tried to impart this practical education but what has been and is being done is necessarily not very much owing to lack of staff and funds. Considerably more could be done, given the necessary facilities in the way of field demonstrations, agricultural exhibitions, cinema lectures, etc.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) The method which has been most successful in influencing and improving the practice of cultivators is practical demonstration in their fields.

(*b*) and (*c*) The quickest way of improving the practice of the cultivators and of inducing them to adopt expert advice is to cultivate a small area of village land under village conditions by improved methods of cultivation and improved crops. The policy of having one small farm in each sub-division of a district does not go far enough. There should be a demonstration farm in each important village, under departmental control. These farms should be run jointly by the Agricultural Department and such private agencies as co-operative societies, village self-governing institutions, well-to-do cultivators and zamindars. The sub-divisional farms should be the feeders of these farms. As demonstration will be their chief purpose these farms will enable us to carry improved agricultural methods to the doors of the cultivators. They will show to the cultivator, in a tangible form, the advantages of better varieties of crops, the use and value of manures, the care and management of cattle, the methods of storing green and dry fodders, the use of suitable improved implements, etc. They will store and distribute recommended seeds and manures, and will stock improved implements either for sale or hire and will thus perform the functions of seed, manure and implement depots. As I have already said, it is most important to run these farms exactly under village conditions and on a paying basis, as only then they will impress the cultivator. They should be in charge of "cultivator demonstrators" or *kamdars* who will be paid from the profits realised.

These village farms can also be made centres of propaganda work. Departmental leaflets can be distributed broadcast from there and special arrangements should be made for educating the cultivators by means of the cinematograph. The Deputy Director has to cover a large area, with a small staff and a limited number of Government farms. If village farms on the lines detailed above are started he will be able to enrol a large number of active workers who will help him considerably in his propaganda work, as they will preach what they practise. Without the whole-hearted co-operation of the cultivator it is hopeless to expect any great improvement in his existing practices.

Our Chiefs and leading landowners should take a very active and prominent part in this organisation. They can do a very great deal by establishing demonstration farms, and in course of time their methods are sure to be copied by the tenants. The higher authorities can do a great deal towards agricultural improvement by impressing upon Chiefs and landowners the absolute necessity of taking active interest in the work. Government can also do a lot through the district officials towards organising small farms in *khas mahal* and wards estates.

(*d*) The following are outstanding instances of the success of demonstration work in the Province :—

1. The spread of Sabour *Dahia* paddy, especially in Bhagalpur circle,
2. The use of sulphate of ammonia for manuring sugarcane and potato crops,
3. The cultivation of groundnut and use of gypsum as manure in south-west Bihar Range, Chota Nagpur, and parts of Orissa,
4. Green manuring winter paddy lands with *dhaincha* in the irrigated tracts of Orissa Delta,
5. The spread of the *Mungo* variety of cane in Orissa Delta and especially in Banki and Khurda Government Estates,
6. The spread of Co. 213 cane in Bihar and deltaic Orissa,
7. The spread of improved winter paddies in Orissa delta,
8. The use of three-roller cane mills in place of two-roller mills in sugarcane-growing areas of Orissa.

The reasons for success are (1) the superiority of the seeds or methods of cultivation recommended over the local practices, and (2) the actual demonstration of these in the cultivator's fields under ordinary village conditions.

QUESTION 4 (*a*).—ADMINISTRATION.—(*a*) I have already suggested, in my reply to Question 1, how the Imperial Department can supplement the activities of provincial agricultural departments by taking up investigations on problems involved in the production of quality crops and those of All-India importance. Whenever the Imperial Department desire that a provincial department should take up any special work which is of more than provincial interest, then the Central Government should finance such investigations.

(*b*) The strengthening of the scientific staff of the provincial departments seems to me of much greater importance, as, after all, each particular problem has to be solved under local conditions. Problems requiring research along highly specialised lines will require specially trained investigators, and when any such work is undertaken by the Central Government, special officers on short-term contracts and on high salaries could be recruited. So far as this Province is concerned, we have always welcomed the help and advice of the officers of the Imperial Department. Still further co-ordination could be secured by allowing more frequent exchange of visits to provincial experimental stations and Pusa amongst the Imperial officers and officers serving in the Provinces.

(*c*) (iii) The improvement of communications is necessary if the producer is to get full advantage of the market prices. At present, owing to lack of roads and bridges across rivers and streams, it is not possible for the average producer to bring his produce for direct sale to the market. Road improvement and construction of bridges will also enable the cultivators to carry manure back to the land from the markets.

(v) and (vi) At present the villager has no means of finding out the current market rates of his produce, and lack of communications does not permit of his being able to bring the produce to the market. He is almost wholly dependent on the sweet will of the local middleman or *mahajan*. Rural posts and telegraph offices could help the cultivator considerably by supplying information regarding current market prices. These could be given a great deal of publicity by

posting them up on the Post Office notice boards for general information.

QUESTION 5.—FINANCE.—(*a*) Without better financing of agricultural operations and the employment of more capital, no permanent improvement in the agricultural conditions of the country is possible. The majority of the cultivators cannot derive any benefit from the work of the Agricultural Department as they do not possess the necessary capital for effecting permanent improvements. The advancing of loans to the cultivator in sufficient amounts on proper security is therefore necessary. This can only be done through the co-operative movement, which should be extended.

(*b*) *Taccavi* loans are usually given in times of scarcity and famine. Under these conditions they can hardly be expected to benefit agriculture materially. These loans, however, are not popular.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) The main causes of borrowing are:—

1. The thriftlessness and extravagance of the cultivator.
2. Lack of ambition owing to illiteracy.
3. Failure of crops due to bad seasons.
4. The uneconomic size of holdings.
5. The heavy burden on the soil due to extinction and decay of cottage industries.
6. Loss of cattle resulting from insufficient feeding and disease.
7. Failure to get the most from the soil owing to laziness.

(ii) The main source of credit is the moneylender.

(iii) The reasons preventing re-payment are:—

1. Absence of thrift.
2. Extravagant habits and the spending of borrowed money on unproductive purposes.
3. The exorbitant rate of interest charged by the moneylender and inhuman conditions on which the money is lent. Usually the moneylender takes away the major portion of the cultivator's crops at previously fixed prices which have no relation with the prevailing market prices.

(*b*) It is doubtful if such measures as the application of the Usurious Loans Act or facilities for the redemption of mortgages will reduce the indebtedness of the cultivator. The spread of education amongst the masses, which will enable them to realise the evils of debt, appears to be the real remedy.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) At present there seems to be no desire amongst the cultivators to consolidate their holdings. They do not realise the evils of scattered holdings. This can only be brought home to them by education. Cinema films can do a great deal by showing the cultivators the advantages they will have when their holdings are more compact. A great deal can also be done through the co-operative movement by starting societies for consolidation of holdings as is being done in the Punjab. Any means which will reduce the pressure on the land will also greatly help in checking excessive fragmentation. The introduction of suitable cottage industries will afford occupation to a certain number of the people and will thus reduce the burden on the land.

(*b*) The main obstacle in the way of consolidation is ignorance owing to lack of education.

(*c*) To restrict sub-division of holdings at the present stage by means of legislation will not be of much use. Once the cultivators have realised the benefits that can be obtained by having compact holdings and when, as a result of education, a demand arises amongst them for the consolidation of holdings, then legislation which will deal with dissentients and remove legal difficulties connected with the transfer of plots, will be necessary.

QUESTION 8.—IRRIGATION.—(*a*) As agriculture at present depends mainly upon rainfall, it follows that extension and improvement of irrigation sources will have considerable effect on increasing the agricultural wealth. The growing of a second crop or, in other words, the increase of area under cultivation, is almost always dependent upon the existence of facilities for irrigation. It is true that our average annual rainfall, about sixty inches, is ample for the growth of crops but this rainfall is, generally speaking, not well distributed, with the result that normal harvests, in the absence of irrigation, are exceptions rather than the rule. The extension and improvement of irrigation facilities is, therefore, a very important question. There are a large number of tanks and *bunds* all over Orissa but these have been, and are being, allowed to decay and silt up. In some places, owing to the greed of the zamindars, these have actually been brought under cultivation. This practice should be put a stop to at once. Apart from providing irrigation by canals, a great deal can be done by reclaiming decayed and silted up tanks and *bunds* and by extending irrigation from wells. The introduction of cheap and efficient water-lifting appliances such as the iron *rahat* wheel should also be pushed ahead. Demonstrations in this direction are urgently needed in order to create a desire for self-help amongst the cultivators. The co-operative movement can also do a great deal in this direction by starting co-operative irrigation societies for reclamation and construction of tanks and *bunds* and installing tube-wells for irrigation purposes.

QUESTION 9.—SOILS.—(*a*) On our departmental farms we have shown that low lands can be drained and made to grow heavy crops of sugarcane and fodders by proper drainage and control of surplus rain water. Also the Pusa system of drainage has proved very useful. Cultivators can improve their lands by adopting these methods and zamindars and landlords can do a great deal by putting up suitable embankments. *Taccavi* loans and loans under the Land Improvement Acts should be given on a large scale for such works and technical advice should be given freely to any one who wants to improve his lands by drainage and *bunding*. There is great scope for enhancing the usefulness of the engineering section of the department but the Agricultural Engineer's staff will have to be increased considerably. The co-operative movement can also do a great deal by organising societies for the construction of *bunds* and draining of lands.

Soil survey is an important piece of work. It was started in the Province some years ago by the Agricultural Chemist but had to be given up owing to the recommendations of the Agricultural Committee. Owing to the diversity of the soils of the Province, a soil survey of the whole Province is necessary and the Agricultural Chemist should be provided with adequate staff to deal with the work.

QUESTION 10.—FERTILISERS.—(*a*) Soils over the greater part of India are notably deficient in nitrogen. In Bihar and Orissa,

soils are also deficient in phosphoric acid. This being so, it is apparent that in order to raise more crops from these soils, the deficiency in nitrogen and phosphoric acid must be made good. This can be done most economically by the use of all the available cowdung. As, however, the cultivators use almost all the cowdung for fuel purposes its use for manure, under present conditions, is very limited. Conservation of natural manures such as bones, oil-cakes, and fish refuse, and their application for increasing the yield of the soil, is very important. Their widespread use depends upon their cost, and as a very large quantity of these is at present exported from the country, this should be put a stop to, if necessary by legislation. Artificial fertilisers are expensive and not within the means of the cultivators. Lately the price of nitrogenous fertilisers has shown a tendency to drop and their use is extending.

(*b*) All fertilisers must be sold under a guarantee. Facilities should be given to *bona fide* cultivators for getting fertilisers analysed in cases of suspected adulteration. This could be undertaken by all chemical laboratories, preferably free of cost, or at a very small charge. All fraudulent adulterations should be made punishable under law.

(*c*) The most effective method of popularising the use of new and improved fertilisers would be by demonstration. This, as I have already said in my replies to Question 3, could best be undertaken at the village demonstration farms. At first the use of recommended manures should be encouraged by free distribution and the cost thereof should be met by Central Banks and co-operative societies and such self-governing institutions as district boards. Government should also make substantial grants to Central Banks and district boards for this purpose. Free distributions should be undertaken for a very limited period over a limited area. Once the cultivators have learnt the benefits to be gained by the use of fertilisers there will be no further necessity for free distribution. It is also important that these manures should be easily procurable and this could be most effectively done by having manure depots attached to the village farms. Co-operative societies should not give cash loans for the purchase of manures but should supply the necessary quantity from these manure depots.

(*d*) Considerable increase in the use of nitrogenous manures has recently taken place all over Bihar and Orissa. The manures are used chiefly for sugarcane and garden crops.

(*e*) A certain amount of work has been done, but not on any large scale or with the same amount of accuracy as in western countries. This is due to lack of funds and staff. In this connection a complete soil survey will also be very helpful.

As a result of the investigations carried out so far, we know that the soils respond fairly well to nitrogenous manures and, in certain areas, to the application of phosphates and gypsum.

(*f*) Under the prevailing conditions as regards cost of fuel, it is difficult to see how the use of cowdung for fuel could be stopped. The average cultivator cannot afford to buy the cheapest fuel even if it was available. A partial remedy would appear to lie in encouraging co-operative planting of fuel plantations on village waste lands wherever these exist.

QUESTION 11.—CROPS.—(*a*) (i) The improvement of existing crops is, and for some time to come will remain, one of the chief duties of the Agricultural Department. Improvements can be brought about by (1) selection and (2) breeding. Selection is purely local

work and must be undertaken on each large and small departmental farm. Fair progress has been made in this direction during the past few years but the work should be speeded up by additional staff and funds

Breeding can only be done by highly skilled workers who are specialists in genetics. Such a specialist should replace the present Economic Botanist. Universities should also take up this work

(ii) There is great scope for the introduction of money crops such as sugarcane, as well as of fodder crops. In Orissa only paddy is grown at present. Large areas are suitable for the cultivation of sugarcane and groundnut. Successful attempts have been made to introduce these on suitable lands by means of village demonstrations. A great deal more could be done by opening village farms and providing facilities for irrigation. No fodder crops are grown in Orissa at present. The cultivation of these is an urgent necessity if any improvement is to be expected in the local cattle. On our departmental farms we have grown successfully such fodders as sugarcane, maize *juar*, cowpea, soybeans, oats, peas, etc., both during the *kharif* and *rabi* seasons, and what is now wanted is an extensive programme of demonstrations in the villages, under the cultivator's conditions. Here again the village farms will be of very great help.

(iii) Ordinarily the cultivator either cannot or will not select seed for himself. In the absence of professional seedsmen the work of distributing improved seeds falls upon the Agricultural Department. That the cultivators do appreciate the benefits of improved seeds is apparent from the demand for the seeds of such crops as improved types of paddy, sugarcane, jute, groundnut, etc. They are also willing to pay for these improved seeds after they have been convinced of their superiority. What is now wanted is a scheme for the distribution of recommended seeds in a systematic manner all over the Province. This could be best done by attaching seed depots to the village farms. The departmental, central and subdivisional farms will supply the seeds to the village farms, where these will be multiplied and distributed to the villagers. Lack of professional seedsmen could be overcome by encouraging middle class youths to take to farming. Under the guidance of an experienced officer these men would multiply improved seeds which could be bought by the department at a premium, and distributed amongst the cultivators. Wherever necessary, improved seeds should be distributed free of cost for demonstration purposes only, the cost being borne by the Government.

(iv) Damage by wild animals is chiefly confined to areas lying adjacent to jungles. In Orissa stray cattle are a far bigger curse than wild animals such as wild pigs and monkeys. These stray cattle do a great deal of damage during the period when the paddy crop is off the land and they are a positive deterrent to any who wish to grow *rabi* crops. Fencing of individual holdings is out of the question as the cost of such fences would be prohibitive. Wherever possible, co-operative fencing of whole village blocks should be undertaken. Government should also encourage this by advancing loans under the Land Improvement Loans Act and such advances should be recovered by instalments spread over a period of twenty years. The real solution lies in educating the masses.

The control of wild animals is a subject which needs investigation and the Imperial Department ought to take it up as it is of more than provincial interest. A special officer should be appointed for this purpose, who will devote his time to finding out measures

for the extermination of these pests by studying their habits, diseases, etc.

(*b*) Groundnut during the rains on poor uplands where low class millets are grown at present: sugarcane in rotation with legumes on *biali* lands: maize under irrigation on early paddy lands.

(*c*) The department has been successful in selecting and distributing improved types of paddies suited to different classes of paddy lands. We have also successfully introduced sugarcane, potatoes and groundnuts on suitable lands.

QUESTION 12.—CULTIVATION.—(i) In Orissa, paddy is the main crop. A certain amount of *rabi* crops is also grown on uplands, but the area under these is small. As a rule no second crop is taken and no rotation is observed. Tillage is done by the country plough which is inefficient, and paddy is broadcasted. The seed rate is very heavy and the crop is thinned by passing the country plough through it when about six weeks old. Better cultivation by a more efficient plough will result in bigger outturn. Transplanting will save a large amount of seed and will give better outturn. Hand weeding, which has to be done at least twice in the case of the broadcasted crop, will be reduced to a minimum as most of the weeds will be destroyed during puddling. For uplands, a more efficient plough will be very beneficial as it will prepare the land better than the county plough. Improved ploughs are expensive and beyond the means of the cultivator. What is wanted is a cheap and efficient plough suited to the local cattle. The whole work involved in the growing of sugarcane, from planting to harvesting, is done by hand. Sugarcane is a crop which responds well to deep cultivation but the country plough cannot do this. Cheap interculturing implements and earthing-up ploughs have a great future.

(ii) No rotation is practised in Orissa. This I think is mainly due to ignorance. Practical demonstrations in this direction will do a great deal in inducing people to practise rotation.

QUESTION 14.—IMPLEMENTS.—No attempts have so far been made to improve the existing implements. As the cultivators are too poor to purchase improved implements, the engineering section of the Agricultural Department should take up this work and evolve efficient implements which will be within the means of the cultivator.

There are efficient improved implements but these are very costly and the average cultivator cannot afford to buy them. Co-operative societies for the purchase, sale and hire of improved implements should be started. Agriculturists should also be encouraged to purchase these on the instalment system. The benefits to be derived from the use of improved implements should be demonstrated on the village farms, which should keep a stock of spare parts. There is scope for the introduction of cheap appliances for lifting water, such as the iron *rahat* wheel. At present the cost of the *rahat* wheel is high and attempts should be made to have these manufactured on a mass production basis. There should be no difficulty in producing these as cheaply as is being done in the Punjab.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) The condition of the cattle in Orissa is appalling. They are badly housed and kept in a state of semi-starvation. Under these conditions the bullocks can hardly be expected to be efficient and the cows are extremely poor milkers. In order to raise more crops and heavier crops, and to make the population more healthy, the cattle must be improved so that the bullocks will be more efficient and the cows will give more milk. Improvements

can be effected by better feeding and better breeding. For general purposes the aim should be to breed dual purpose animals. For this purpose stud bulls should be kept at each village farm, to meet the requirements of neighbouring villages. Brahmani bulls are no use for this purpose as these animals are usually the poorest specimens of their kind. A great deal can also be done by selection and elimination and reducing the number of useless cattle. Breeding alone, however, will not bring about the desired improvement, if the cattle are to be neglected and kept under semi-starvation conditions. Demonstration and propaganda should be directed towards making the cultivator realise that it will pay him to keep his cattle in good condition by proper feeding and management. He should be taught to grow fodder crops and should be encouraged to stall-feed his animals.

One of the most important agricultural industries is dairying. The department has not paid the necessary amount of attention to the problem that it deserves. We have already three breeding herds and the milk is supplied to the neighbouring towns. A fourth herd is being built up at Cuttack and Government have recently sanctioned a scheme for putting this on a proper basis. A herd of buffaloes is also being started in North Bihar. A great deal more could be done by establishing model dairy farms at the headquarters of each district. These farms could either be started jointly by the Government and the district boards or by the Government alone, and they should be run on a commercial basis in order to encourage private enterprise to take up the work. Poultry keeping and rearing of goats and sheep should also be encouraged. The agriculturist must be taught the importance of dairying. The most effective way to do this would be to start co-operative dairy and livestock societies. These societies should be helped by Government by subsidies in the initial stages. Members will sell their produce to the society whose business it will be to find suitable markets for the disposal of members' produce. If, in the beginning, the societies are started with the right class of cultivators as members, who would take the necessary trouble to make these societies a success, the more backward and poorer of the agriculturists are sure to follow their example.

Middle class youths should also be encouraged to take up dairying as a means of livelihood. Facilities should be afforded to them to receive practical training in dairy-farming at such centres as the Imperial Dairy Institute. They should be helped with necessary capital on easy terms to start with, and a special experienced officer should look after these beginners and help them to make their undertaking a success.

(*b*) There are hardly any pastures nowadays. The zamindars and landlords have brought under cultivation all good pasture lands and in their place have set apart the poorest lands which grow practically nothing. These are now really exercising grounds. Co-operative societies should be encouraged to pool their resources and acquire suitable lands to be set apart as pastures. The members of these societies should be charged small fees for the privilege of grazing their cattle. This alone will not be sufficient. The cultivator must grow fodder crops and must be taught how to preserve these, both in the dry and green state as silage in *kutcha* open pits. Stall-feeding should also be encouraged. Demonstration and propaganda work through village farms will do a great deal.

A very large proportion of the paddy straw is at present used for thatching houses.

Mr. D. R. Sethi.

Phosphates and lime are not present in sufficient quantities in the more common fodder crops. These deficiencies could be met largely by manuring the fodder lands properly and by encouraging the use of rice dust as food for cattle. Rice dust contains fair quantities of phosphates.

(*c*) There is fodder shortage from January to June but it is most acute from April to June. Young growing cattle usually take six weeks, after the rains have set in, before they show signs of thriving.

(*d*) The following are some of the methods for improving and supplementing the fodder supply:—

(1) The growing of fodder crops such as *juar*, cowpea, maize, soybeans, etc.

(2) The preservation of fodders, both in the dry and the green state, as silage in *kutcha* open pits.

(3) The use of thatching grasses for house-thatching instead of paddy straw which should be reserved for the cattle.

(4) The adoption of stall-feeding.

(5) A reduction in the number of useless cattle kept at present.

(*e*) Generally speaking our large landlords, zamindars and Ruling Chiefs have done nothing towards the improvement of agricultural and animal husbandry. Higher authorities can do a great deal in making them realise their paramount duty of giving a lead in these directions. With their co-operation a great deal can be done and even then it will be a long time before any appreciable advance in the improvement of Indian cattle will be apparent. It must be brought home to them that the fine breeds of cattle to be found in Britain have been evolved by "Gentlemen" farmers at their own expense and they must follow the landlords of Britain if they are to retain their leadership.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) A cultivator who grows only one crop has not got work for more than eight weeks in the year, but those who double crop their lands or grow such crops as sugarcane work for about four months in the year. In the slack season some cultivators migrate to such industrial centres as Calcutta and Jamshedpur and find employment as day labourers, but the majority of them idle away their time sitting at home.

(*b*) and (*c*). It is well known that the agricultural population is slowly but steadily increasing. It is, therefore, difficult to see how this increasing population will be able to maintain itself on the already heavily burdened soil unless new and subsidiary occupations are found which will relieve the pressure on the land. The development of suitable village industries, both as subsidiary and independent industries, is of urgent necessity. Demonstration, or, in other words, practical education of the people, appears to be the only means of encouraging them to adopt suitable subsidiary industries. The Co-operative and Industries departments should join hands and start co-operative industrial societies for such purposes as silk rearing, weaving, spinning. The Co-operative Department should also organise societies for the production and sale of fruit, rearing of poultry, fish culture, etc. The obstacles in the way of adoption of these village industries are:—(1) laziness, (2) ignorance, (3) want of practical demonstration, and (4) in some cases religious prejudices.

If, by practical demonstrations, the cultivator can be made to realise that he could relieve himself considerably from the worry and expense of clothing his family if he were to grow a small quantity of cotton on

his homestead land, spin it during the leisure hours, and have it made into cloth by the village weaver it would go a long way to afford him substantial relief, In Orissa, castor is grown on almost all homestead lands in the village. *Eri*-rearing is therefore a most suitable subsidiary occupation for the people. In each important village there should be a co-operative society for the rearing of this silk worm, and a demonstrator should be attached to groups of such societies for giving the necessary instructions to the members.

(*d*) The Co-operative Department can do a great deal by organising societies for the preparation of agricultural produce, for example, oil pressing, rice hulling, *gur* making. These industries will not only give occupation to a certain number of the agricultural population but will help agricultural development generally by conserving supplies of cattle food and manure. Cultivators, as I have already pointed out, should be taught by practical demonstration the use of natural manures and the benefits to be derived from stall-feeding of cattle, and *taccavi* loans should be given on a more liberal scale for the purchase of manures.

QUESTION 20.—MARKETING.—(*b*) Marketing and distribution of agricultural produce at present are very unsatisfactory. The cultivator more often than not is forced to sell his produce to the village dealer, who is also the *mahajan*, at rates which have no relation to the current market prices, because of his indebtedness. This *mahajan* is thus able to appropriate a large share of the profits. The *mahajan* in turn sells the produce in the nearest market to dealers and commission agents, who either distribute it to the consumer or export it. In order that the producer should get a reasonable share of the profits of his produce, the marketing and distribution of agricultural produce needs organisation. This can best be done through co-operative sale societies which will deal directly with the wholesale merchants. Such organisations will also be in a position to effect improvements in the quality and purity of the produce.

In my replies to Question 4, I have pointed out that post and telegraph offices in rural areas can help the villagers and co-operative sale societies by giving publicity to current market prices.

QUESTION 22.—CO-OPERATION.—(*a*) (i) In order to expand the co-operative movement, the staff of the Co-operative Department for propaganda and supervision should be considerably increased.

(ii) Non-official agencies can do immense good. They have an unlimited field for improving agriculture through the co-operative movement. Ruling Chiefs, landlords, and well-to-do zamindars can do a great deal by organising both credit and non-credit societies amongst their tenantry.

(*b*) The co-operative movement in the Province has been mainly directed towards the opening of primary credit societies for lessening the agriculturists' indebtedness. Some experiments have also been conducted towards organising non-credit societies, but except in the case of grain *golas*, these have not prospered. This may be due to not having the right type of men as members, or to bad management, but it is difficult to see why, if properly organised and managed, these societies should not be just as successful in this Province as they have been in other places. No doubt the provision of cheap credit through primary societies is of great importance but it has its dangers also. All that the directors of Central Banks and Unions are concerned with is to loan out their funds as quickly as possible in order that these may earn interest. The welfare of the members of primary societies, at present, does not concern them. Loans are given without adequate

preliminary enquiries and rarely is any attempt made to see that the borrower spends these loans more on productive purposes than on such unproductive items as marriages, *sradhs*, etc.

True, there are provisions in the bye-laws of societies which guard against these practices, but they are rarely enforced. What is wanted is the education of members by means of propaganda, and to make them realise that cheap credit is meant for producing wealth and must not be squandered away. Unless this is done, cheap credit will be a far bigger curse than the village moneylender.

The organising of non-credit agricultural societies is of the utmost importance and should be taken up in right earnest by men of experience. Without such societies it is not possible to make much headway towards the improvement of agriculture.

(*c*) When all other means have failed to make a small minority fall in with the wishes of the majority in order to give effect to co-operative schemes aimed at the improvement of agriculture generally, then legislation must certainly step in and compel such minority to join for the benefit of all.

(*d*) Credit societies in Orissa have not achieved their object. They have certainly provided cheap and easy money but they have failed to make the cultivator either more efficient or more thrifty.

Oral Evidence.

67,506. *The Chairman*: Mr. Sethi, you are Deputy Director of Agriculture in the Orissa Range of this Province?—Yes.

67,507. I see, by your answer to Question 1 (*a*), that you are anxious that the possibilities of pisciculture should be examined?—Yes.

67,508. Why do you regard fish culture as important?—In Orissa fish forms a very important part of the dietary of the rural population and we have a large number of tanks all over the division. As a matter of fact, almost every village is surrounded by tanks and if we could find out methods of breeding fish and demonstrate these methods to the people, I think that it would do a great deal of good to them. It would also be a means of improving the sanitation from the point of view of malaria. There are certain species of fish, I understand, which destroy the mosquito larvæ.

67,509. In answer to Question 2 (vi), you express the view that a quarter-acre plot is too small to be of any real use in teaching agriculture. What would be an ideal size?—I should think that to teach a number of boys anything of practical agriculture we should have at least sufficient land for a pair of bullocks; in Orissa it would be five acres. We cannot employ a pair of bullocks economically on a quarter-acre plot of land.

67,510. In answer to Question 2 (x), you are anxious to see model farms of suitable size established and run on a business basis, so as to satisfy the educated middle class folk that a decent living can be made out of farming. I take it that you would agree that no experiments must be carried out on those farms if they are to be run on strictly commercial lines?—That is so.

67,511. Quite apart from that aspect of the question, do you think that there is land available in the Province for the middle class youth?—There is any amount of land in certain parts of Orissa.

67,512. Have you ever worked out the capital that would be required per acre for this purpose?—No, I have not worked it out.

67,513. Would it be virgin soil?—It would be forest land of course.

67,514. Have you yourself had the advantage of a visit to agricultural stations or colleges in other Provinces?—I have seen some of the agricultural stations in the Punjab from where I come, as also the college there. I have also seen Pusa and the agricultural stations in the Mysore State.

67,515. You agree that it is a great advantage to an officer occasionally to see what is going on in other Provinces?—Yes, especially those stations at which similar work to his own is being carried on.

67,516. And he also has the advantage of meeting fresh minds; is that not so?—Yes, one picks up a lot of new ideas from one's brother officers working on similar problems in other places.

67,517. In answer to Question 4 (c), you recommend that prices should be advertised in rural areas by the post and telegraph offices, and you call them current market prices. Would that be the price at the terminal market, or what?—The price at the nearest *gola* (market).

67,518. Would there not be some danger in publishing these prices, which would necessarily be above those obtained by the cultivator, unless it were made perfectly plain to the cultivator that a certain deduction would be necessary on account of transport?—I quite agree.

67,519. You recommend, on page 355, that co-operative societies should cease giving cash loans to their members ostensibly for the purpose of purchasing manures. Is that because, in your experience, the money is sometimes spent on other things?—As a rule it is always spent on something else; very little of it is spent on manures.

67,520. Would you like to see the loan made in kind?—Yes, we have tried that experiment in one or two Central Banks in Orissa and it has proved a very great success.

67,521. Do you mean to say that the Central Bank is actually lending out manure?—Yes, when members of a primary society want money for the purchase of manures, they usually go to the Central Bank, but instead of giving them the money the Central Bank make the advance in the shape of manure.

67,522. Has that limited at all the amount of value borrowed?—So far as my experience goes it has certainly limited the value for the manure; they simply take the amount of manure they want and no more.

67,523. What about the uninvested surplus funds at the disposal of Central Banks?—The Central Banks at the present moment are nothing but cheap-money lenders. They try to put it on to the primary societies as fast as they can.

67,524. *Mr. Calvert*: Cheap-money lenders did you call them?—Yes, it is cheap money; they would not get it at that rate from the *mahajans*. In Orissa, in some parts, the interest charged is as much as thirty per cent.

67,525. *The Chairman*: But you have been able to persuade the Central Banks to adopt this plan nevertheless?—We started this only two years ago when we took to sulphate of ammonia.

67,526. Do zamindars in this Province take any interest in practical agriculture?—None whatever. I know of just one instance but that is an exception, and I do not know of any one else.

67,527. Do you think that, if the landlord class took a personal interest in progressive agriculture, the rural population would be perfectly prepared to follow their lead?—I think so.

Mr. D. R. Sethi.

67,528. What do the landlord class, who do not take any interest in agriculture, do with their spare time?—They spend their time in places like Calcutta and other large towns and not in the villages.

67,529. *Mr. Calvert*: Would you kindly let us know how many Central Banks you have ever inspected?—I do not inspect any Central Banks.

67,530. Do you inspect any unions?—No.

67,531. In your opinion all that the directors of Central Banks are concerned with is to lend out their funds as quickly as possible; is that so?—I have attended their general meetings and whenever I go to a place at which there is a Central Bank I make a point of meeting the directors who happen to be there and I always discuss the matter with them. They say that as they have to borrow money from the Apex bank they cannot keep their money idle in the bank for a long time but are anxious to invest it as soon as possible.

67,532. You base your statement upon what the directors have told you?—Yes.

67,533. *Dr. Hyder*: Have you got many extensive, unoccupied areas in the Province on which you could settle youths of the middle class?—I can only speak of Orissa and not of any other part of the Province.

67,534. Are there large unoccupied areas?—In the backward districts of Angul and the Feudatory States there are, and I believe also in parts of Sambalpur there are large areas of unoccupied land.

67,535. Have you any idea as to what would be the acreage of such land?—No.

67,536. You have got no institution in this Province which imparts higher agricultural education?—I can only express my personal views on that point. I myself think that at present our whole work is very seriously handicapped for want of such an institution.

67,537. I take it that according to the system which prevails here, it is part of your duty to train men for your department? May I know how many men you have been able to train?—Up to now I have trained two Assistant Directors and about eight farm overseers.

67,538. Who trains the members of the lower service, such as *kamdars*?—We train them on our farms.

67,539. Which system do you think is better, your present system or a system under which the men are trained at a central institution and then put them on to the farms?—The second system would certainly be better, because it would relieve the Deputy Director of a considerable amount of what I prefer to call work which is not his, legitimately.

67,540. Apart from this matter of relief, do you think the system would be better because the candidates would derive a better training?—They would certainly have a better preliminary training. But with regard to *kamdars*, these people must be trained on the farms; it is no use training them at a college, because we take on actual cultivators as *kamdars*.

67,541. But what about the people who are above the *kamdars*?—Our experience with the overseers is this that when they came out of the Sabour College they were not as good as the men whom we took on ourselves and trained as overseers. These men from the college usually suffer from swelled head and think that because they have gone through a course of training at a college they know practically everything about agriculture. With regard to the senior or Provincial Service men I might say that we take on graduates in science,

but we have not sufficient time to devote to these men. Personally I think that the men should be trained first in a college and then they should go to the farms for practical work, and any promising men from among them should be sent up to a research institute where they may concentrate their energies on any one particular subject. They would then make very good research workers.

67,542. That is your own opinion?—That is my personal opinion.

67,543. Members of the Provincial Agricultural Service should have training in research at a central institution or at an agricultural college?—Yes. An agricultural college will not be of much use in this Province unless and until it is affiliated to the University and gives a degree and that degree carries as much weight as a pure science degree of the University at present.

67,544. If you had an agricultural institution and also a degree, then you would be satisfied?—Yes; I would be.

67,545. You say somewhere in your note that the number of useless cattle should be reduced. How would you reduce them?—I think the useful cattle should be given the serum—simultaneous inoculation, and the others should be left unprotected. That appears to me to be the simplest method; but I know very little about veterinary science.

67,546. What about the others?—They should not be given any protection.

67,547. *Babu A. P. Varma*: You have always been in Orissa?—I have always been in Orissa, except for the three years when I was on deputation to the Kapurthala State.

67,548. Is there any difference between Orissa and Bihar proper?—I could not say; I have no experience of Bihar at all.

67,549. *The Raja of Parlakimedi*: On page 350 you say: "Owing to the absence of a provincial agricultural college, the training of the subordinate staff of the department is undertaken by the Deputy Directors in addition to their other duties. This work takes away a considerable amount of the time of these officers which should really be spent in the discharge of their legitimate duties and is therefore an obstacle to progress. The re-starting of the college is therefore desirable." Where would you locate the college?—That is a question I have not thought about. We had a college at Sabour; we have got the buildings there; but if we think of locating the college anywhere else than Sabour, I think the best place would be Patna, because the University is here. My own view is that, if at all it is decided to re-start the college it should be linked up with the veterinary college. It would save a considerable amount of expenditure. I may also state that you cannot separate agriculture from veterinary or veterinary from agriculture. The question of cattle-breeding, for instance, is closely connected with the growing of fodder crops. Therefore, I think, the agricultural college and the veterinary college should be in one place.

67,550. Do you believe in having both the departments under one control?—That is a policy on which I am afraid I cannot express any opinion.

67,551. Do you think Orissa will be sending its boys to Patna?—Yes; why not?

67,552. There would not be any difficulty?—The Orissa boys now come to Patna to take the Honours course; they come to Patna for engineering; they used to come from Orissa to Sabour; we had a certain number of boys from Orissa in the Sabour College. I should think there would be no difficulty.

67,553. Is the use of sulphate of ammonia for manuring sugarcane and other crops becoming more and more popular?—In Orissa it is used chiefly for sugarcane; it is becoming more popular.

67,554. Have you been keeping a record?—This last season Government sanctioned a distribution of eleven tons free of cost. The Banki Union purchased ten *maunds* and supplied it to their constituents; the Khurda Central Bank obtained four tons. These are the broad figures so far as I can remember.

67,555. Is that confined to certain areas only?—It is only used where sugarcane is grown. Orissa is more a rice country than anything else; but there are certain areas where sugarcane is grown, and there they use this manure. In the first instance we give the manure free to the cultivator to manure one-third of the acreage he has put under sugarcane. If he sees that the manure is really of any use he goes straight off and buys the manure himself next time. As a matter of fact, we had an instance this year in the Khurda sub-division. We distributed six tons of sulphate of ammonia free in the first instance, but people came along to buy the manure and whatever stock we had at that time (the season was far advanced) they took and paid for it.

67,556. What is the variety of cane grown where this manure is used?—Co. 213.

67,557. That is doing very well, I suppose, and is not being affected by any disease?—It has not been affected so far. I have now three varieties under trial at the central farm at Cuttack, but none of them are more promising than Co. 213.

67,558. Co. 213 gives a considerably greater yield of sucrose than the local variety?—It contains a higher percentage of sucrose, but it also gives a considerably greater yield of cane when manured.

67,559. Has the effect of manure upon the crop been demonstrated to the people?—Yes.

67,560. They are adopting that now?—Yes; we began distribution of sulphate of ammonia only in 1925-26, and they are now taking to the use of it.

67,561. What about its quality as regards drought-resistance?—I would not say it was a drought-resisting cane, but it is certainly a cane which will stand a fair amount of mishandling.

67,562. It is a hardy cane?—Compared with Co. 205, it will not stand drought better, it likes water in the early stages of growth. I do not think it is in any way superior to the local cane so far as water requirements are concerned.

67,563. As regards demonstrations, you suggest that a plot should be taken somewhere in the village. Are you in favour of carrying on demonstrations in the cultivator's own field?—That is what we are doing nowadays. We do all our work in the cultivator's own field wherever we can get an intelligent cultivator who will carry out the demonstration under his own conditions. As a rule it is difficult to get such intelligent cultivators. We should certainly carry out the demonstration in the cultivator's fields under his own conditions; but in cases where it is not possible to get such cultivators, the district boards and Central Banks should take over a plot, let the cultivator himself run it, guarantee him against loss and leave all the profits to him. Demonstration should be done on the cultivator's own field; otherwise it will be of no use. Demonstration farms run by the department will not have very much effect

67,564. How far have you been successful in distributing improved seed in Orissa?—The staff is so small and the area so big, that we have not done very much. But I may state that during the past five years we have distributed 800 *maunds* of paddy; last year alone I distributed seed cane for over 500 acres.

67,565. As regards paddy, is your aim to improve the quality of the grain or to increase the quantity of the yield?—In Orissa the quality does not count very much; it is the quantity that counts. But wherever we can combine quality with quantity we prefer that.

67,566. Have you *pinjrapoles* where aged animals can be kept?—I know there is a *pinjrapole* at Cuttack run by Marwaris.

67,567. How many animals can they take?—I could not say.

67,568. Is it fairly popular?—I do not know whether it is popular, but the Marwaris seem to keep the place going all right.

67,569. *Professor Gangulee*: As Deputy Director of the Orissa range can you tell the Commission what is the exact nature of your duties?—I have to study the local agricultural practices and think out what I can do to improve those practices.

67,570. You are in charge of experimental work?—Yes.

67,571. There are four farms in your range?—Yes.

67,572. You are also in charge of the training of subordinates?—Yes.

67,573. And you have additional administrative duties?—Yes, whatever pertains to these farms and to the officers subordinate to me.

67,574. Do you find time to devote to experimental work?—I devote as much time as I can. The work on these farms is experimental, and a considerable portion of my time is devoted to that work. In addition, I have to do the training of the subordinates. If I had not to look after the training of these subordinates, I could devote more time to my experimental work.

67,575. The training of subordinates takes away a great deal of your time. We have been told a great deal about the training of these subordinates by Deputy Directors. What sort of training are you able to give?—The training aims at making good farm managers of the senior recruited men, and making the others good farm overseers who will be able to discharge their duties of the farm properly.

67,576. Do they understand the fundamental sciences involved in agricultural practice?—The Provincial Service men are graduates in science, chemistry or physics; we have no botany here. We also recruit men who have taken mathematics. They understand the elementary sciences, but they do not understand the applied sciences.

67,577. This is also an arrangement for training graduates for the superior grade?—Yes, that is what I have explained.

67,578. I was referring to the training of the subordinate staff?—For the subordinate staff we usually take matriculates, but preferably boys who have passed the intermediate examination in science or arts. If we can get men from agricultural colleges we prefer them, but as our own men from the Province do not go outside we have to fall back upon intermediate or matriculate boys.

67,579. In this experimental work that you carry on, who plans the scheme of experiments?—I plan it for each of my farms, and I submit it to the Director of Agriculture for his approval.

67,580. When you undertake an experiment, do you carry it on for a number of years before you publish the data?—Yes. In my range, I started work on the rices of Orissa in 1916, and I have been carrying

it on up till now. I have been able to select three paddies suited to the three different classes of lands in Orissa. The work is still going on, and it will go on for some time to come.

67,581. You give a number of outstanding instances of the success of demonstration work in the Province. Could you tell the Commission what significant improvement in agricultural practice you have observed actually in the cultivators' fields in Orissa?—Generally speaking, it is very difficult to observe anything, but if you go to particular areas where particular work is being done, you will find such improvements. In places where sugarcane of the local variety was being grown, or sugarcane was not being grown, we have distributed improved sugarcane, and it is growing there already. In certain unirrigated tracts, where we have introduced green manuring of transplanted rice or, in irrigated tracts, green manuring of broadcasted rice, if you go during the rice growing season you will find miles and miles of country having both green manure and rice growing at the same time. Of course, when the time comes it is puddled under, and after that you cannot see the improved practice at all.

67,582. What is the specific improvement you are referring to; improved varieties of rice evolved by your department or green manuring?—Manuring is the improvement.

67,583. In answer to Question 11 (*a*) (iii), you say: "What is now wanted is a scheme for the distribution of recommended seeds in a systematic manner all over the Province". What is the position now?—The position now is that if I have got, say, sugarcane to distribute, I have to do the missionary's job; I have to begin with preaching. I have to get hold of a co-operative society or somebody who will try the thing. It is haphazard; wherever I can get a person to take the improved seed or improved manure, I request him to try it. We ought to have a systematic scheme for the distribution of seeds and manures. For this purpose we require village demonstration plots. My personal experience is that if there is a thing really worth having the cultivator will take to it at once.

67,584. You have no seed farms?—No.

67,585. Through your experiments, if you evolve, say, a new variety of paddy, how do you propagate it?—At present, this is done by the department as well as by the cultivators to whom we originally give free seed; our condition is that in case there is a demand for that particular seed because it has proved superior to the local seed, we will buy back the produce at the current market rates, for distribution to other people.

67,586. So, the cultivators grow your selected seeds?—Yes, in addition to whatever quantity we can grow on our own farms. We purchase it from them at the current market rates, and that only occurs when what is produced on our farms is not sufficient to meet the demand.

67,587. You suggest that the Imperial Department should deal with problems of All-India importance. Could you cite one or two instances of problems of All-India importance?—Take the case of quality crops like tobacco; it is the same as dealing with cotton. Or, take the case of fruit culture; that is an All-India question. So far as rice is concerned, my experience is that a variety of rice which has proved to be superior in South Bihar may prove the reverse in Orissa.

67,588. What is your idea when you suggest that crop experiments should be done by the Imperial Department? Why should not the provincial departments do it?—The provincial departments will carry on th

subsidiary work, so to say. It would be a good thing if we had a central research station, for instance, for fruit culture somewhere for upper India.

67,589. Your idea is that with central research stations you will be able to tackle fundamental problems more efficiently and more economically?—Yes. Take sugarcane for instance; that is exactly what has happened in the case of sugarcane. We get varieties from Coimbatore, we try them from year to year, and if we find any that suit us we keep them.

67,590. And the Provinces will repeat the experiments?—That must be done.

67,591. And the third stage will be dissemination of the results?—Yes, through demonstration.

67,592. In answer to Question 4 (*b*), you suggest that special officers should be recruited on short-term contracts. Do you think that is a feasible or attractive proposition?—That depends upon the problem that has to be tackled. If you want a really good man, you will have to pay him fairly highly, and I do not know if the Government of India would be willing to appoint a long-term man from outside, as such men at present are scarce in India.

67,593. You are familiar, I take it, with some of the research organisations in Europe?—When I was in England, I visited the Rothamsted Experimental Station.

67,594. What is the system there? Are the research workers recruited on short-term contracts?—No, they are whole-time workers. What I really had in mind when I put that down was the trouble about appointing local men. You will not, in the beginning, be able to get local men competent enough to carry on research work. The short-term contract men will train up Indians who will be able to carry on the work.

67,595. You attach a great deal of importance to soil survey. Are you satisfied with the nature of the soil survey that you are undertaking?—We have got no soil survey.

67,596. I understood that it was being carried on in certain tracts by the Department of Agriculture?—The Agricultural Chemist did start the work. He surveyed a very small area in South Bihar, but he had to stop there; the Legislative Council refused to sanction any further funds for the purpose.

67,597. Apart from that, are you satisfied with the quality of work done in that survey?—Yes.

67,598. You would like to see that sort of work extended in the Province?—Yes.

67,599. Why?—When I want to try a new manure in any particular place, I am not quite certain whether it is really wanted there or not until I have tried it. If there was a soil survey, it would give me a preliminary indication.

67,600. You say "Considerable increase in the use of nitrogenous manures has recently taken place all over Bihar and Orissa." What are the manures?—Chiefly sulphate of ammonia.

67,601. Is its use being extended?—There is a growing demand for it.

67,602. In the irrigated area?—Both in the irrigated and the unirrigated areas, especially where sugarcane and vegetable crops are grown.

67,603. With the type of demonstrator that you have, are you quite satisfied with the nature of the propaganda that they are able to carry on?—They do very little propaganda. Any propaganda that is

done is done by the Deputy Director or the Inspectors; the demonstrators only carry out the work there.

67,604. Let us take, next, the case of Inspectors. Are you satisfied with the nature of propaganda they are able to carry on?—My contention is that we have not got a sufficient number of them to cover any appreciable area. The Inspectors have to look after the sub-divisional farm and at the same time do propaganda work. That is not quite what I should like to have. I should like to have an entirely separate, properly trained staff for propaganda work.

67,605. Is your relationship with the co-operative societies close and intimate?—In my range it is. I keep in fairly close touch with the co-operative societies; otherwise, I would not be able to do any work at all.

67,606. Do you think the general purpose of cattle breeding should be a dual purpose animal, or just a single purpose animal?—So far as Orissa is concerned, we have got quite a suitable type of bullock for our requirements, but our trouble is that these animals do not give any appreciable quantity of milk. So far as Orissa is concerned, I would keep to the local breeds and simply try to improve their milking capacity.

67,607. *The Raja of Parlakimedi*: By selection?—You cannot divorce animal husbandry in this Province from fodder growing which is much more important than breeding or selection. In Orissa, if we do not tackle the fodder problem, the result will be starvation, because there is not enough good fodder.

67,608. *Professor Gangulee*: Has any attempt been made by your department to encourage fodder growing?—I have been working on fodder for a number of years but the trouble is to get the people to take it up. The animals have only work for five months in the year. The rest of the time the animals are turned out in the fields and they pick up whatever they can, and the cultivator is quite satisfied; he does not want to feed them any more.

67,609. Do you see any tendency towards the introduction of stall-feeding?—There is scope for that.

67,610. Do you know whether the farmers are taking to proper stall-feeding?—They stall-feed their animals during the working period. They feed them on concentrates.

67,611. You know the co-operative movement in Orissa well. In answer to Question 22 (*d*) you say that the co-operative societies in Orissa have not achieved their objects and that though they have given cheap and easy money they have failed to make the cultivator either more efficient or more thrifty. Could you tell us what are the difficulties which face the co-operative movement in Orissa?—I think that the members of these societies do not understand what co-operation means, what the movement stands for. They go to the president of the society or whoever loans the money, ask for money, sign a paper and come back and there the matter stops. The real trouble is that there is no propaganda work to educate them as to why these societies are there and what they are for. If this is not done, I am strongly of opinion that mere money-lending business will do great harm to the people.

67,612. You think that the right kind of propaganda is not going on?—That is so.

67,613. What suggestions can you offer to improve the position?—I think the subordinate staff of the co-operative societies, that is to say, the bank clerks and the inspecting officers, should be given special training in propaganda work. They should be given a small jurisdiction to cover. They should hold meetings of the members of the society and repeatedly tell them what the society is meant for.

67,614. What sort of training would you like to give these men and where?—I think the best people to decide about that are the officers of the Co-operative Department; it is rather difficult for me to say anything about it. They know more.

67,615. Would you include agriculture in their training?—Yes. I would include agriculture also.

67,616. Your idea is that they should tell the people that the co-operative movement stands for the general welfare of the community and not merely for moneylending business?—Quite so.

67,617. *Mr. Kamat*: In answer to Question 1 (*a*), you state that agricultural development, including research, has not made the same progress in this Province as in some others owing to insufficiency of staff. Have you in your mind the insufficiency of the subordinate staff or of the superior staff?—Both.

67,618. You endorse the idea that instead of seven Deputy Directors you should have something like fourteen. This was the scheme put before this Commission by Mr. Dobbs?—So far as the staff of the ranges is concerned, I agree with the proposals made by Mr. Dobbs. We should have at least seven Deputy Directors, fourteen Assistant Directors and a corresponding number of subordinate staff, in addition to the purely research workers.

67,619. Is this stagnation in the department, if one can call it stagnation, due only to insufficiency of staff, or is it due to any particular outlook or policy?—I am afraid I am not in a position to say anything about the policy. All I can submit to this Commission is that the lack of progress is due to want of necessary staff.

67,620. Did you get your foreign training before you entered service or after you entered service?—Before I entered service.

67,621. Since you entered service, you have had no study leave or further training?—No.

67,622. You suggest that middle class youths could be taught dairying as a profession. Have you ever tried whether that could be a business proposition?—I have not tried it as a business proposition. I have a small herd on my farm at Cuttack. Experimental farms seldom pay but this little herd of mine is paying its way. The demand for milk is very great in Orissa. For instance, if you go to Puri you will be told by the *gowala* that for first class milk he will charge eight annas a *seer*, for second class milk six annas, and for third class milk five annas. A person interested in the thing could certainly make a very good business proposition of it if he confined himself merely to milk production.

67,623. Have you kept regular accounts in the commercial fashion, charging to debit everything that should be charged to debit? What dividend could you make on the capital invested?—We keep our accounts according to the prescribed Accounts Manual. We try to take into consideration every factor that comes in so far as dairying is concerned. Our object is not purely the supply of milk. The herd that I keep is meant more for establishing a progeny herd than anything else. Looking over our accounts for the last four years, we find that it just pays for itself, leaving out of account the increased value of the young growing stock.

67,624. So far as your knowledge of other Provinces goes, have you heard of any other Province where dairying on a small scale has become a paying business proposition?—I have no experience of other Provinces but I have heard Mr. Smith's views. I believe he is of opinion that dairying on a small scale is not a practicable proposition.

67,625. I am asking you this with reference to the natural course of things. If a proposition is a paying proposition, it becomes well-known and is at once taken up in different parts of the country. Take the question of a rice mill. If it pays, people take it up in village after village, tract after tract. If dairying were a paying proposition it would probably have attracted the attention of men all over the country?—So far as dairying is concerned, the fact is that nobody has ever attempted to start it up till now. If one or two start and make a success of it, then others will take it up.

67,626. My question was, why have they not made a start, if, as you say, it is a paying proposition?—I think that at least at headquarter stations, Government, either by itself or jointly with others, should start dairy farms and prove to the people that these pay. People have not taken it up merely for want of the necessary information.

67,627. You think that the problem is still in the pioneering stage?—Yes.

67,628. *Sir Thomas Middleton*: You have told us your method of giving practical training to the assistants whom you have taken into the department. Do you prescribe any definite course of reading for them?—No. So far as work on the central experimental stations is concerned I take them round with me when I am going over the fields myself. I tell them what work I am doing and show them how to do it and then make them do it. I also explain to them the various experiments I make.

67,629. You give them no systematic course of instruction; they are left to themselves. I suppose they read books for any technical information which they require?—I choose the books for them and tell them what to read, but I have no means of knowing whether they do it or not; I do not insist on it.

67,630. You refer, on page 351 of your evidence, to the policy of having one small farm in each sub-division and suggest an increase. How many small farms would you advocate? One in every important village would clearly be impossible?—I do not mean a Government farm. What I mean is a demonstration plot, run by the cultivator himself under the guidance, and where necessary under the control, of the department.

67,631. To what extent would the departmental control come in?—I would restrict it to advice.

67,632. Do you propose providing any grant-in-aid?—No, I would not, but I would guarantee them any losses.

67,633. On page 353 of your note, you refer to the heavy burden thrown on the soil because of the extinction and decay of cottage industries? What cottage industries have you in mind?—For instance, the production of cloth for household use. In the Punjab almost every villager spins his own yarn and gives it to the weaver to make his cloth for him. I do not say that he can meet all his requirements but he can, at any rate, meet part of his requirements.

67,634. I am not referring to the position in the Punjab?—In Orissa, all the time that I have been there, I have not seen any particular cottage industry which has become extinct, but I understand that there used to be that kind of thing before. They used to husk their own rice; now they sell the paddy and get the rice from the *mahajans*.

67,635. Is this not because that pays them better?—I have not gone deeply into this matter.

67,636. You have no definite information as to whether, in Orissa, the practice of spinning is much less common now than it was in former times?—I have no definite information.

67,637. Do the cultivators in Orissa make their own wooden implements?—They have the village implement maker and they pay him so much at harvest time and get all their supplies from him. The carpenter makes the ploughshares and yokes for them and they supply the material, but for the labour they pay him so much in kind at harvest time.

67,638. You think that this industry will not decline?—No.

67,639. On page 355 of your note you say that in Bihar and Orissa soils are deficient in phosphoric acid. Can you tell me whether this deficiency is general, and whether in all the districts in which you have experimented you found phosphates to be necessary?—In Orissa wherever I have conducted experiments I have found that crops respond fairly well to phosphates.

67,640. Is it mainly in connection with the rice crop that your experience lies?—In deltaic Orissa, in the greater part of the country, the only crop is rice, but in the upper areas near the hills sugarcane and *rabi* crops are also grown.

67,641. A crop like gram would not respond to phosphates, would it?—No.

67,642. Mustard and rape?—No. The crops which respond to phosphates particularly are *moth*, cow peas, linseed, *urid* and sugarcane to a certain extent.

67,643. You refer to the very great damage done by stray cattle in Orissa. Is fencing not practised in any areas?—No.

67,644. In answer to Question 14, you suggest that the Agricultural Department should evolve efficient implements which will be within the means of the cultivator. If you want improved implements and better constructed implements, you have got to increase the prices. Can the cultivator afford that in Orissa?—What I had in mind particularly was the Persian wheel and the iron plough, for instance, which have been introduced here from the Punjab. At present our department gets these made by firms in Calcutta who charge something like three hundred rupees per set, whereas in the Punjab the Persian wheel would be obtained for something like eighty rupees. If the production were done on a mass basis we ought to get it very cheaply.

67,645. Are you using the Punjab iron plough in Orissa now?—Yes.

67,646. *Professor Gangulee*: On whom would you depend for this mass production of implements?—That would have to be undertaken by some business firm.

67,647. On private enterprise?—Yes.

67,648. *Sir Thomas Middleton*: You refer to the very poor quality of Brahmani bulls turned out in Orissa. Is there any evidence that the quality has been deteriorating in recent years?—The man who wants to dedicate the bull tries his best to procure the cheapest kind of Brahmani bull that he can get.

67,649. But that has not always been the case, has it?—I am talking from my experience of recent years. The Brahmani bull has always been the worst animal of its kind, in Orissa at any rate. If a man must buy his Brahmani bull, he is certainly not going to spend a lot of money on it; he tries to spend as little as he possibly can.

67,650. *The Raja of Parlakimedi*: But that is not the case in Puri, is it?—I do not know; all I know is that Brahmani bulls are always poor and may be seen about in the streets in a pitiably starved condition and are worse than useless.

67,651. *Sir Thomas Middleton*: You give a melancholy account of the quality of the cattle in Orissa and you suggest that demonstration and propaganda work in the villages would do a great deal of good. What do you think could be done in the way of propaganda?—I might answer that question by an illustration if you will permit me to do so. About two years ago I bought twenty cows for three hundred rupees. They were giving not more than half a pound of milk per twenty-four hours. I brought these cows along to my farm and I gave them as much green fodder as they would eat with the result that now, in no case, do I get less than three pounds of milk a day. I submit that if a cultivator were to keep a smaller number of cattle than he keeps at the moment he would be able to feed them better and derive greater benefit from these fewer and better-fed animals than he would if he kept a herd some five or ten times as large. That is the kind of propaganda work that I should like to carry on.

67,652. I grant that you can make the demonstration, but what I wish to know is whether it would appeal to the cultivator? Would he pay any attention to your demonstration? Would cultivators come round your farm, see the improvement you have effected and then go back to their own land and do the same for themselves?—I do not see by what other means we can bring it home to him. If he cannot see for himself that here is a cow which in the beginning was only giving half a pound of milk but now is yielding as much as three pounds of milk because of a little looking after, then I say that the Agricultural Department can hardly do anything more for him.

67,653. What form of propaganda can appeal to the owner of an animal who sees its ribs sticking out through its skin and yet pays no attention to fodder supply? Do you think that anything will induce cultivators to look after their cattle better?—I am afraid I cannot say. If practical demonstration is not going to induce these people to feed their cattle better, then I do not know what will.

67,654. We have had enough visual demonstration of the fact that the cattle want feeding?—The only other thing to do is for the zamindars and landlords to take up the work and carry it on.

67,655. Why do they not?—That is a point that I should like the Commission to ask some zamindar.

67,656. You must have heard many opinions on the point?—They take no interest at all in the matter.

(*The witness withdrew.*)

Babu TARA PRASANNA GHOSE, Ranchi.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—If agriculture is to be intensely developed in India more research work will have to be carried on in different branches of agriculture, including vegetable growing, fruit growing, poultry rearing, animal husbandry, etcetera, and veterinary matters by the best experts available whom the country can afford to employ. Efficiency in research work should not be sacrificed to the

fetish of Indianisation of the services; scientific men of the best type should be recruited from England, India and foreign countries to carry on research work to improve the agriculture of India, upon which mainly depends the well-being and prosperity of the population of India.

Research work should be under the control of the Central Government and expenses should be met from the central exchequer. The number of research workers should be greatly increased and research should be carried on both in a central institute and in suitable centres in different Provinces.

QUESTION 2.—AGRICULTURAL EDUCATION.—(x) Agriculture can be made attractive to middle class youths if it can be proved to them that agriculture is a profitable business. This can be done either by Government starting demonstration farms on business lines and, by successfully working them, proving that the profit earned will suffice to provide a decent living to young men of the middle classes, or by Government encouraging people to form co-operative farming societies on a limited liability basis. These farms must be demonstration farms on strictly business lines and Government should help such societies by granting loans free of interest, at least for some time, and then at a low rate of interest, and also by offering the advice of the officers of the Agricultural Department free.

If Government can establish commercially successful farms in each divisional centre, young men of the middle class will gladly join them as apprentices, for the unemployment problem among the youths of the middle class has become so acute that they are anxious to go back to the land. In these farms they will learn how to make a decent income from agriculture, after which they will start their own individual farms or will join a co-operative farming society such as is mentioned above.

Another measure that will help the young man of the middle class to take to agriculture is to invent, by systematic research and experiment, improved labour-saving machines and implements suited to the conditions of India. Young men of the middle class are not physically so strong as the cultivators are and therefore if they take up agriculture as a profession they will not be able to compete with the cultivators as they will not be able to work so hard in the fields and will have to engage hired labour, which is becoming scarce in rural areas. On account of the industrial development of the country, village people are going to work in industrial areas where they can earn more. The invention of labour-saving machinery, which the young men of the middle class will be able to use intelligently and with less physical exertion, will help them in making their farms pay, as they will not have to employ hired labour and will be able to cultivate their farms themselves.

(xii) Adult education in rural areas can best be carried on by organising a village co-operatively. By adult education of the rural population I mean that the village people should be educated in new ideas of improved agriculture, cottage industries, better village sanitation and other village welfare works. Their minds should be elevated to a higher ethical plane. They should be taught to abstain from drink and litigation. A spirit of service should be communicated to them which will lead them to work jointly for the well-being of the village community. This can best be done by co-operative workers, by persistent preaching, propaganda and demonstration in the villages. For adult education, suitable magic lantern slides and cinema pictures should be utilised extensively by the co-operative workers in the villages.

Babu Tara Prasanna Ghose.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) Practical demonstration, on the fields of the cultivators, of improved methods conducted by the cultivators themselves under expert supervision.

(*b*) The effectiveness of field demonstration in villages can greatly be increased, as I have mentioned above, by inducing the cultivator to carry on the demonstration of improved methods on his own field under expert supervision. Two plots should be taken side by side. On one plot cultivation should be done by improved methods and on the other by the old hereditary methods. At the time of harvesting, the crops of these two fields should be gathered separately in the presence of the villagers. The increased yield from the field where cultivation was done by improved methods would readily convince the people of the usefulness of learning better methods of agriculture. If once the improved methods can be introduced successfully in one village, inhabitants of neighbouring villages will also adopt these measures readily.

(*c*) In my opinion, co-operative workers in rural areas are the best persons to induce the cultivators to adopt expert advice as they have already gained the confidence of the rural population. From my long experience in village improvement work I can say that preaching and propaganda can best be done by co-operative workers in rural areas. In the Khunti sub-division of Ranchi district, where the co-operative workers and officers of the Agricultural Department worked hand in hand, agicultural improvements were introduced very successfully amongst the rural population.

(*d*) I know of several instances of the success of demonstration and propaganda work in rural areas. I describe below only two instances.

In Charid village, in the Khunti sub-division of Ranchi district where there is a co-operative society, the members of the society were induced to grow groundnut jointly (a new crop introduced for the first time in the village) on the field of one of the members. When the members found that the groundnut crop they got from the field was about four times the value of the paddy crop which they used to grow on it, they readily took up the cultivation of groundnut and, in the next year, several plots of groundnut were cultivated separately by the members of this society. Every year the cultivation of this crop is increasing in Charid and the neighbouring villages. The landlord of Charid village also learned the cultivation of this crop from his tenants and is now doing it extensively.

In the same village, Charid, one member, Nand Ram Munda, was induced by the co-operative workers to grow sugarcane on his own field. When he found that this was a very profitable crop (he got ten times more than he used to get by growing paddy on it) the next year he quadrupled the area of his sugarcane field. Other members, seeing that Nand Ram Munda had made a good profit by growing sugarcane, took up the cultivation of sugarcane and about a dozen plots of sugarcane were cultivated in the village the next year. Subsequently the cultivation of sugarcane (which was a new crop to this part of the country) began to spread rapidly and in the current year the Government farm at Kanke could hardly meet with the demands for sugarcane setts by the cultivators in Khunti area. In another village in Khunti sub-division, Pelwal, where the whole village has been co-operatively organised, the co-operative workers induced the village people to grow groundnut jointly on uplands, and sugarcane on riverside waste land properly drained. Both the crops were new to the area. The village people did the

cultivation of both the crops very successfully under expert supervision. In the next year more than ten plots of sugarcane were cultivated by the river side by the members. The landlord of the village learnt the cultivation of sugarcane from his tenants and began to grow sugarcane on his own lands. The cultivation of groundnut also was done the next year by several members on different plots.

I am aware also of striking instances of failure of demonstration and propaganda work. In Jamhar village, situated also in Khunti sub-division, the officers of the Agricultural Department induced the landlord, one of the biggest zamindars of the district, to grow sugarcane, a crop new to the area, under the supervision of the officers of the said department. The sugarcane was very successfully grown, but not a single cultivator of the village could be induced to grow it the next year.

Another instance of failure of propaganda and demonstration I saw in Kutey village in Sadar sub-division of the Ranchi district, where there is an old type of co-operative credit society affiliated to the Ranchi Central Co-operative Bank. In this village practical demonstrations of the cultivation of groundnut and sugarcane (new crops to the area) were conducted under the supervision of the officers of the Agricultural Department on the landlord's land by the landlord's men. Both crops were very successful, but in the next year the officers of the Agricultural Department failed to induce a single cultivator of the village to grow them, although they promised to supply setts free, manure and the services of a *kamdar* to supervise the cultivation.

The reasons for such failures are not far to seek. Firstly, the demonstration was not conducted on the cultivators' own fields through the agency of the cultivators themselves. Secondly, though there is a co-operative society in the village, it is simply a loan institution. The co-operative workers of the area never tried to educate the minds of the people by preaching and propaganda. Had it been impressed upon the minds of the members of the society by the co-operative workers that, in order to better their condition, it was absolutely necessary to learn better methods of agriculture and to cultivate paying crops, that cheap loans alone would not help them to improve their economic condition but that they should learn to utilise their capital more profitably by carrying on agriculture on improved lines, it would not have been difficult to induce the members to adopt improved methods of agriculture.

In Khunti sub-division co-operative workers by persistent preaching and propaganda prepared the minds of the rural population to adopt new methods in agriculture and therefore demonstration achieved successful results in that area.

QUESTION 4.—ADMINISTRATION.—(c) (i) Both the Agricultural and Veterinary departments are very much under-staffed. For doing the work in rural areas the subordinate staff of both the departments should be increased. One Agricultural Overseer and one Veterinary Assistant should be given to each *thana*, if the departments want to help the rural population of India. At present only one District Inspector is employed with four or five *kamdars* by the Agricultural Department to introduce agricultural improvements in a district. This staff is quite inadequate to do the work entrusted to them efficiently. In the current year, when through the efforts of the co-operative workers in Khunti sub-division in the district of Ranchi the cultivation of sugarcane was introduced for the first time in

forty villages, the Agricultural Department failed to supply a sufficient number of *kamdars* and overseers to supervise the cultivation of sugarcane introduced in these villages.

The position of the Veterinary Department is also similar. There is at present only one Veterinary Assistant in every sub-division consisting of about two thousand villages. When an epidemic breaks out it becomes impossible for the Assistant to visit one-tenth of the villages in which the epidemic has broken out.

(iii) To improve the transport of agricultural produce from rural areas for marketing, more good and bridged roads should be constructed. By establishing a central road board this can be done. Government should also encourage private companies to open motor services for carrying goods; by so doing, roads can be made more useful to the cultivators as it will facilitate the transport of their agricultural produce.

At the time of construction of roads the Public Works Department and the district boards should consult the Agricultural Department. In hilly country like Chota Nagpur, roads can be utilised as embankments for storing rain water for irrigation purposes in the dry season. By constructing culverts at a high level, water can be supplied to the uplands during the rainy season which will help in converting the upland wastes, whose yields are almost *nil*, into paddy fields.

QUESTION 5.—FINANCE.—(*a*) The best step that can be taken for the better financing of agricultural operations is the organisation of co-operative societies of the right type in each and every village. For short term credit the present system of financing through co-operative societies is quite adequate, but for long term credit, without which any substantial agricultural progress in rural areas is not possible, arrangements should be made to allow long term credit to the Provincial Co-operative Bank at a low rate of interest, not exceeding three per cent per annum from the Imperial Bank or State Bank. The Provincial Bank will then be in a position to allow long term credits (which they are not doing now) to Central Co-operative Banks which finance village societies, at a rate of interest not exceeding four per cent. The Central Banks in their turn will allow long term credits to village societies at a rate of interest not exceeding five per cent. The village societies will then be able to allow long term credit to their members at a rate not exceeding six-and-a-quarter per cent. From my fourteen years experience as a worker for improving the economic condition of the village people, I can say with some confidence that, until some arrangement is made to grant long term credit to the cultivators at a very low rate of interest, no land redemption or land reclamation scheme can be worked successfully. In Chota Nagpur the best lands of the cultivators are generally taken in *zarpesgi* (*i.e.*, mortgage with possession) by the moneylenders. The amount advanced on the security of their lands is generally very heavy. The net annual yield of these lands, if converted to cash value, will not be found to pay an interest exceeding about six-and-a-quarter per cent per annum on the advance. Therefore, as I have said before, until some arrangement is made to grant long term credits to cultivators at a low rate of interest, no scheme for redeeming their mortgaged lands will be successful. Efforts made in the Chota Nagpur area to redeem cultivators' lands by granting loans to them through co-operative societies at eighteen-and-three-quarters to fifteen-and-five-eighths per cent have totally failed; the men whose lands were thus redeemed could not pay the interest and *kist* of their loans from the

net yields of their lands redeemed, and the result has been that, in those areas where tenants lands are saleable, their lands were sold by the societies to realise their loans. Where the lands are not saleable the members were much harassed and put to great loss by the attempt of the societies to realise their dues by attaching their crops and cattle which were sold by auction at nominal prices. Thus the cultivators lose both their crops and cattle but the amount of their debts to the societies remains almost the same. It is also a very common occurrence that when co-operative societies put pressure on those of their members who have failed to pay their interest and *kists*, those who had redeemed their lands from the *mahajans* by taking loans from the societies again go to the *mahajans* and mortgage their lands to repay the societies' debt. So the lands again pass into the hands of the *mahajans*. Attempts made to redeem cultivators' lands by advancing loans from the societies at a high rate of interest have done more harm than good to the cultivators.

Reclamation or improvement of lands is also not possible until arrangements can be made to grant long term credits at a low rate of interest to the cultivators. For constructing *bunds* and digging of wells for irrigation, for making systematic terraces on sloping lands to save them from erosion in Chota Nagpur, long-term loans at a low rate of interest should be granted to the cultivators through the co-operative societies.

(*b*) I am not in favour of the present arrangement for advancing *taccavi* loans. The *taccavi* loans should be advanced to the cultivator through co-operative societies, which should see that the money is profitably invested.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) Failure of crops cattle disease and litigation.

It is known to all that in a great part of India the success of crops greatly depends on the rainfall. If there is not sufficient rainfall in any year, cultivators do not get good crops and some of the lands even remain uncultivated.

Failure of crops is also due to diseases. Here, in Chota Nagpur, it often happens that the paddy crop totally fails in some area on account of *raya* or *sandha* diseases. The officers of the Agricultural Department say that the disease is due to starvation of the plant, there not being sufficient plant food in the soil. The crops are also destroyed by floods. When the crops fail or are destroyed the cultivator is compelled to borrow money to meet his household expenses and the cost of cultivation in the coming year.

Cattle disease:—

Everyone knows that the prices of cattle have gone very high as compared with prices twenty-five years ago with the result that when a cultivator loses draught animals through an epidemic he is unable to make up the loss from the very small amount of his savings, if any, and therefore has to borrow to replenish his stock of draught animals.

Litigation:—

From my long experience as an honorary worker of the Co-operative Department I can say that litigation has greatly helped to increase the indebtedness of the rural population. To meet the cost of litigation, which in these days has become very heavy, the cultivators have to borrow. Since the village panchayat system became

disorganised and lost all hold on the village people no new organisation has been established in the rural areas to take its place, amicably settle disputes amongst the village people and thus save them from ruinous litigation.

(ii) Mostly village moneylenders where there are no co-operative societies. These moneylenders charge a very high rate of interest except when lands are mortgaged to them with possession.

(iii) Failure of crops, cattle disease, prolonged illness and death of working members of the family, and unforeseen expenses on litigation.

(*b*) Not necessary; special measures will only help to demoralise the rural population. They will lose all faith in their own resources and ability and will always try to seek protection under the special Acts.

(*c*) It is not desirable to curtail the credit of cultivators by limiting the right of mortgage and sale. By so doing we should reduce their credit and lessen the value of their property. In Chota Nagpur, according to the law, the tenant cultivators are not allowed to sell their lands. The result is that whenever these tenants want to raise some ready money they find a purchaser for a portion of their holding; they then approach the landlord with the proposal that they want to surrender the portion of the holding for which they have found a purchaser, on the condition that the land shall be settled with the purchaser they have found and that the price to be paid by the purchaser will be equally divided between the landlord and the tenant cultivator. The law prohibiting the transfer of land has not succeeded in stopping this method of transfer; it has only helped in reducing the value of their land. The tenant cultivator in Chota Nagpur would have got the full price had there been no restriction, whereas he is now getting only half the value of his property.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) There is no doubt that excessive subdivision of holdings is causing loss in agricultural efficiency. This can be remedied by consolidation of holdings as has been done in the Punjab through the efforts of the Co-operative Department, or by inducing the owners of small plots in one area to cultivate their lands jointly. This will increase agricultural efficiency inasmuch as big areas formed by the owners of small plots joining together can be properly fenced and intensively cultivated by digging wells and tanks for irrigating the whole area. The Co-operative Department should try to induce the owners of small plots to join together and form joint farming societies. If the Co-operative Department, with the help of the Agricultural Department, succeeds in making one such society successful *i.e.*, profitable to the owners or members, this type of joint farming society will greatly increase in number and the problem will be nearer to solution.

(*b*) The obstacles in the way of consolidation are the intense conservatism of the people and the Hindu and Mahommedan laws of inheritance. The conservatism of the rural population can be removed by persistent preaching and propaganda, and by actual demonstration in the villages that consolidated holdings are more profitable than scattered ones.

QUESTION 8.—IRRIGATION.—(*a*) In my opinion there is a possibility of vast extension and improvement in the existing systems or methods of irrigation But in different areas different methods will be necessary.

(i) In the hilly districts of Chota Nagpur there are innumerable hill streams and rivulets. There are great possibilities of utilising them for irrigating adjoining fields for growing sugarcane and other crops which require intensive cultivation, and for converting waste lands into cultivable fields. I think (though I am a layman and have not the expert knowledge of an irrigation engineer) that by constructing systematic high-level *bunds* (see my answer to Question 8 (ii) on both sides of these hill streams, from the source all along its course, their strength can be greatly diminished and it will be possible, by throwing embankment across their beds and providing escape channels, to create big reservoirs of water for irrigating vast areas of lands that are at the lower level, by simply opening the gate of the escape channel in the winter and dry season. As the hill streams take their rise at the highest level and descend rapidly, the water from the reservoir constructed at the higher level of their course can easily be taken down to the lower level for irrigating land. Water can also be pumped up from these reservoirs to irrigate lands in the upper level. I suggest that a special irrigation officer should be appointed to find out how these hill streams can best be utilised for irrigation purposes.

(ii) In Manbhum and Sambalpur districts there are vast possibilities of excavating new tanks and re-excavating old tanks for irrigation purposes. In many parts of Bengal and Bihar where old irrigation tanks have silted up, these can also be re-excavated. Co-operative irrigation societies could be organised for excavating and re-excavating tanks with the help of those cultivators whose lands will be irrigated from these tanks.

In other districts of Chota Nagpur high level *bunds* or tanks of the Kanke type (these *bunds* were first constructed at the Kanke Government farm by Mr. Dobbs) will serve a very useful purpose for irrigation. Chota Nagpur soils are divided into three classes, *viz.*, sloping uplands called *taurs*, *chaura* lands, that is lands between the uplands, and the low lands, and *don* lands or low lands. These *chauras* are paddy-producing lands. They suffer much from drought; if September rains fail, which generally happens in Chota Nagpur, the crops of these lands suffer greatly. As, out of the area of the paddy-producing lands in Chota Nagpur, *chaura* lands cover at least two-thirds of the whole area, even partial failure of crops on these lands causes famine and scarcity. To save the crops of these *chaura* lands, high level *bunds* should be constructed on the slopes of the uplands by throwing embankments parallel to the depressions in which terraces were made for making *chaura* lands and *don* lands. In the rainy season storm water coming from the highest level of the uplands could be stored here. This water will gradually sink into the soil and by a process of percolation will preserve the moisture in the fields that are below the level of these *bunds*. As the *chaura* lands will be at a lower level than these *bunds*, these lands will absorb a sufficient amount of moisture and even if the September rains fail there will be enough moisture in the fields to help the early paddy to ripen.

These high level *bunds* will not only save the *chaura* lands from drought but also, by preventing the storm water from descending rapidly with great force into the lowlands, help to save the crops of these lands from damage. In my humble opinion if systematic high level *bunds* are constructed in Chota Nagpur, it will not only improve the condition of the paddy-producing lands but will also greatly increase the area of such lands. As the embankments of the high level *bunds* are to be constructed on the slopes of the uplands, there will remain between the embankments and the *chaura* lands a broad strip of the lower portion of the upland which could easily be converted into paddy fields by simply terracing.

Babu Tara Prasanna Ghose.

In two *khas mahal* villages of Ranchi district—Kochbong and Hesel—by storing storm water coming from the top level of the uplands in systematic high level *bunds* constructed on the slopes, considerable areas of uplands in each village which were suffering badly from erosion have been converted into paddy-producing lands.

If systematic high level *bunds* are constructed all over Chota Nagpur the benefits that will be derived, in addition to those mentioned above, are, firstly, these *bunds* by catching the greater portion of the storm water will not allow it to descend rapidly into the rivers which have their sources on the Chota Nagpur plateau and flow down to Orissa, Western Bengal and South Bihar, and will thus prevent destructive floods in those areas.

Secondly, these high level *bunds* holding the storm water will help the water to sink into the soil. This will make the sub-soil water bring more moisture to the uplands, making them fit for cultivating winter crops without irrigation.

Thirdly, the water collected in the *bunds* in the rainy season will gradually percolate down and re-appear in the beginning of the winter season as springs in the beds of the rivulets, thus creating a perennial flow of water into those channels and converting them into sources of irrigation of adjoining lands in winter and the dry season. By organising a village co-operatively, systematic high level *bunds* could be constructed in every village at a very moderate cost.

(iii) *Wells.*—Any number of surface wells could be dug for irrigation purposes in Chota Nagpur if cultivators were given long-term loans at a rate not exceeding six-and-a-quarter per cent. In villages where there are co-operative societies, four or five cultivator members can be induced to dig a well jointly for doing intensive cultivation.

The possibilities of well-boring, that is, tapping subterranean channels of water for irrigation, should be properly investigated in Chota Nagpur by Government. If the experiment is successful Chota Nagpur can be converted into a land of gardens. The greatest drawback in Chota Nagpur is the want of facilities for irrigation. If an unlimited supply of water could be got by tapping subterranean channels co-operative irrigation societies could be organised for boring wells.

District boards with sufficient income could be induced to take up well-boring in Chota Nagpur.

QUESTION 9.—SOILS.—(*a*) (i) Soils of waterlogged areas can be made to yield more if the land is properly drained. For improvement of the soils in marshy lands, systematic drainage is absolutely necessary.

Soils can be immensely improved by proper manuring. To improve the soil by the application of proper manure, it will be necessary first to make a soil survey of the whole country. The land to be improved must be first analysed and the chemical property wanting in it should be found out before applying manure. The soil can be improved either by applying farmyard manure or artificial fertilisers. But to get a sufficient quantity of farmyard manure, it will be necessary for the cultivators to increase their stock of cattle. Until they can produce enough fodder it will not be possible for them to keep a sufficient number of cattle. In Chota Nagpur cattle suffer much for want of fodder as the cultivators do not grow any fodder crop and the straw from the paddy is not sufficient for the whole year. There are grazing grounds no doubt, but from January to July the grass dies out and little is left. So the only means of improving lands by applying natural manure in Chota Nagpur is by raising fodder crop on uplands, by applying sulphate of ammonia

as the uplands of Chota Nagpur are very deficient in nitrogen, or by increasing the quantity of paddy straw by applying the same manure in the paddy fields. The increase in fodder will help the cultivators to keep more cattle and more farmyard manure will be available to further improve the soil.

(iii) The sloping uplands of Chota Nagpur suffer much from erosion by rain water from the high lands. This can be prevented by putting systematic *ails* or borders, one foot high, round every plot and by constructing high level *bunds*. [See my reply to Question 9 (*b*) (ii).]

(*b*) (i) The soils of the uplands in Kanke Government farm have immensely improved. Formerly the soil was very poor. The land being on a slope, much deterioration was caused by erosion. The upper half of the sloping land has been surrounded by *ails* or borders one foot in height. This prevented the silts being washed away and improved the soil. These uplands were further improved by applying farm yard manure and artificial fertilisers, and where formerly the soil yielded practically nothing it is now yielding heavy fodder crops such as *makai*, *juar*, soybeans, and food crops such as groundnut. The lower portion of the sloping uplands of the farm have been terraced out systematically and converted into paddy fields by constructing a series of high-level *bunds* or tanks for catching the flood water coming from the upper portion of the uplands during the rainy season. This water is stored in these high level *bunds* or tanks and by a process of percolation supplies moisture to the paddy fields below, which formerly yielded almost nothing.

The soil of the waterlogged low lands of Kanke farm has also undergone marked improvement. Since these lands have been properly drained they have much improved and are yielding heavy crops of sugarcane.

In villages where uplands have been converted into vegetable gardens and surrounded by *ails* and borders and manured by farm-yard manure every year, the soil has also improved. In many villages in Khunti subdivision where there are co-operative societies, low lands have been much improved by drainage by the joint endeavours of the co-operative workers and officers of the Agricultural Department, and are made fit to grow sugarcane which is the most paying crop in the area.

(ii) The soil of the sloping uplands of Chota Nagpur have suffered much and are still suffering marked deterioration on account of erosion of surface soil by water running rapidly over them during the rainy season.

(*c*) Government should try to find out why each particular area of cultivable land has been abandoned by the cultivators and should try to remove the drawbacks which prevented the cultivators from cultivating those lands.

QUESTION 10.—FERTILISERS.—(*a*) In my opinion, greater use can profitably be made of both kinds of manure, natural and artificial. In Chota Nagpur the cultivators use no manure on the low lands where they grow paddy; they depend entirely upon the washings which these low lands get for fertilising them. Formerly there were forests in every village and the low lands used to get washing from these forest lands which contained rich organic matter and continued to preserve the fertility of the soil. But after the systematic destruction of the village jungles in Chota Nagpur the paddy-producing lands have lost a good deal of their productive power and crops generally suffer on account of *raya* or *sandha* diseases. The cause of these diseases, the officers of the Agricultural Department say, and we have also found from practical

experience, is starvation, *i.e.*, want of manure. I have already mentioned in my answer to Question 9 (*a*) (i) that in Chota Nagpur, farmyard manure is not available in large quantities. Whatever farmyard manure the cultivators get from their half-starved cattle they use in one or two plots of their uplands. Other plots are cultivated without any manure and so the cultivator gets a very poor crop from them. Oil-cakes are not available in any large quantities in Chota Nagpur as the major portion of the seeds produced in the area are exported. Yields of both upland and lowland crops of Chota Nagpur can be immensely improved by applying suitable manure. As natural manures are not available at present in sufficient quantities, artificial fertilisers such as surphate of ammonia and gypsum can very profitably be used.

(*b*) The wholesale dealers in fertilisers should arrange to supply them in sealed bags of moderate size. These should be distributed to the cultivators only through the co-operative organisations.

(*c*) By systematic propaganda and preaching among the rural population and by demonstration on the cultivators' own fields. The propaganda and preaching should be done by people in whom the villagers have some faith or it will be fruitless. The co-operative workers, both paid and honorary, are the best persons to induce the village people to use improved fertilisers. Government should in the beginning by giving handsome grants help the central co-operative organisations to stock improved fertilisers and to open depots in suitable centres in the interior for distribution.

(*d*) Recently, in the area of operation of the Ranchi Central Co-operative Bank and the *Khunti* Central Co-operative Bank, through the efforts of the co-operative workers over 700 *maunds* of sulphate of ammonia have been sold to cultivators, mostly members of co-operative societies, to try a fertiliser which is altogether new to this part on a small scale for sugarcane and paddy.

(*e*) From my personal experience I can say that the effects of manuring with sulphate of ammonia and gypsum in the lands of the Kanke Government farm and in my own lands are very encouraging. But I think the effects of the artificial manures should be tested carefully over a wide area.

(*f*) By inducing the ryots, by propaganda and preaching, to plant quick-growing trees on waste lands and in hedges, and by arranging a supply of coal to the villagers at a moderate price by providing special facilities for transport. The villagers fully know the value of cowdung as manure; they are compelled to use it as fuel because, on account of deforestation, fuel has become very scarce in rural areas.

QUESTION 11.—CROPS.—(*a*) (i) The existing crops can be greatly improved by making adequate arrangements for distributing selected seeds evolved on the Government farm among the cultivators.

(ii) For the introduction of new crops a good deal of propaganda and preaching among the rural population by persons who have already gained their confidence is necessary. Simultaneously, a market should also be found for the new crops introduced or their cultivation will be discontinued by the ryots. For introducing fodder crops much propaganda and preaching will also be necessary; the cultivators should be induced to keep milch cattle and these fodder crops could be utilised for feeding them. But until a market is found for the milk and its products or arrangements made for transporting the surplus fodder crops to areas where there is a deficiency by introducing special means of transport, growing of fodder crops will not be profitable to the cultivators and will be discontinued.

(iii) The distribution of selected seeds among the cultivators can best be done by co-operative organisations. As in the case of popularising improved fertilisers, so also in the case of systematic distribution of selected seeds, Government should help Central Co-operative Banks to open seed stores, jointly with manure stores, at convenient centres in the interior.

(iv) Gun licenses should be granted as a rule to agriculturists for the protection of their crops, and should not be refused unless there is some special ground for doing so.

(*b*) In place of *gundli* and *marua* groundnut can profitably be cultivated on the uplands of Chota Nagpur.

(*c*) The cultivation of sugarcane on the drained low lands of Chota Nagpur.

In the Khunti area of Ranchi district the cultivation of this crop has been introduced among the members of the co-operative societies in several villages. By growing sugarcane the members are making ten times the profit they used to make by growing paddy on those lands.

The cultivation of groundnuts on the uplands is also bringing more profit to the cultivators (who are members of co-operative societies in Khunti area) than the cultivation of *marua*, *gundli* or *surguja* used to bring them.

The improved seed of *dahia* paddy supplied by the Kanke farm, and distributed amongst the members of the co-operative societies in Khunti area through the Local Central Co-operative Bank, gave very good results. It is a very heavy yielding and drought resisting paddy and grew very well on *chaura* lands (*i.e.*, the lands just below the uplands and at a higher level than the lowlands) and its yield was also greater than that of other varieties of paddy cultivated on such lands.

QUESTION 12.—CULTIVATION.—(i) In Chota Nagpur, the ploughs in common use plough very shallow. The improved ploughs are mostly very heavy, and are therefore not suitable for the draught cattle of Chota Nagpur which are small and weak as they do not get sufficient food. If a light deep-tilling plough can be invented it will be possible to improve the cultivation. Other improved implements can be introduced in Chota Nagpur for better cultivation if these can be had at a very low price, as the cultivators of Chota Nagpur are very poor and cannot afford to buy costly things.

(ii) In Chota Nagpur the cultivators follow the system of rotation of crops in cultivating their uplands. In low-lying land they cultivate paddy every year. Through the efforts of the co-operative workers and the officers of the Agricultural Department, sugarcane has been introduced as a rotation crop on the drained lowlands in some parts of the Ranchi district. Groundnut, similarly, has been introduced as a rotation crop for uplands. Both these crops have proved to be very paying.

QUESTION 14.—IMPLEMENTS.—(*a*) Yes; it is necessary to improve the existing implements and also to introduce new implements and machinery. I do not think much research has been done as regards useful, labour-saving agricultural implements suited to Indian conditions. People engaged in manufacturing agricultural implements should be encouraged by Government by giving rewards and granting subsidies to them, which will help them in the evolution of improved implements suited to Indian conditions.

(*b*) Practical demonstration should prove that the improved implements will serve the purpose of the cultivators better than those they are using at present. The manufacturing firms should try to supply

these improved implements at the cheapest possible price, otherwise Indian cultivators, poor as they are, cannot be induced to buy them even if it is proved to them that these are better than those they are using.

(*c*) The best means for the distribution and sale, throughout the country, of improved implements is that the manufacturers should appoint all central co-operative organisations as their agents. I have already mentioned that the co-operative workers have succeeded in gaining the confidence of the rural population and with their help it will not be difficult to introduce really good and useful and, at the same time, cheap implements.

QUESTION 15.—VETERINARY.—(*c*) (i) The agriculturists are not making full use of the veterinary dispensaries at present. This is due to their ignorance and their ingrained conservatism. This can be removed by systematic propaganda and preaching by persons who have already gained the confidence of the rural population. I cannot avoid the temptation of citing a case here in support of my views. About a year ago a cattle epidemic broke out in a village in the Khunti sub-division of the Ranchi district. The Veterinary Surgeon in charge of the dispensary at Khunti was sent to the village by the Sub-Divisional Officer to inoculate the cattle. He stopped there for two days but he could not induce a single villager to bring his cattle for inoculation. The Veterinary Assistant went back to Khunti and reported the matter to the Sub-Divisional Officer who asked him to take the help of a co-operative worker working in the Khunti area. This worker went with the Veterinary Surgeon to the village, where there is a co-operative society, collected the village people and explained to them that the inoculation of the cattle would save them from the attack of the epidemic. Next morning all the cattle of the village were brought to the Veterinary Assistant for inoculation.

If the officers of the Veterinary Department want to do any good to the rural population they should co-operate whole-heartedly with the co-operative workers in the area in which the officers are placed, in the same way as the officers of the Agricultural Department in Chota Nagpur division are doing now.

The Veterinary Department should also arrange to train a sufficient number of men of the *gowala* caste in veterinary work as the Agricultural Department in Chota Nagpur has trained men recruited from the cultivator class in improved agricultural methods for looking after demonstration work in the villages. The services of these *kamdars* are placed at the disposal of the central co-operative organisations which are introducing agricultural improvements in rural areas. Similarly, the services of the *gowalas* trained in veterinary work can be placed at the disposal of the central co-operative organisations, in the paid and honorary workers of which organisation the villagers have implicit faith. When there is any epidemic or cattle disease in a village these trained *gowalas* can visit the place with the co-operative workers and they will meet with no opposition to their inoculations.

(*d*) Conservatism of the rural population. They refuse to have their cattle inoculated. Moreover, the Veterinary Department have not sufficient staff. If the villagers are induced to take the help of the Veterinary Department the present staff will not be able to cope with the work when contagious diseases break out.

I do not advocate legislation: we should try to change the mentality of the village people by persistent preaching, propaganda and demonstration. Adult education is absolutely necessary in the rural areas for improving the existing conditions. This can best be done by organising co-operative societies of the right type in the villages.

(*f*) Please refer to my answer to Question 15 (*e*) (i).

So far as my knowledge goes, no fees are charged for inoculation. If we can convince the people that inoculation will save their cattle from epidemics they will be ready to pay inoculation fees.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i) This can best be done by supplying good parent stock to co-operative unions and societies free, or at a omderate price, from the Government cattle breeding farms. The number of such farms should be increased, and pedigree bulls, buffaloes, sheep, goats and cocks should be supplied from such farms to the co-operative societies.

Of course a good deal of propaganda and preaching is necessary amongst the rural population to induce them to improve their cattle by breeding from selected bulls. In Chota Nagpur the condition of the cattle is very bad. This is due to the scarcity of fodder. The first thing that will be necessary will be to induce the village people to grow fodder crops. Until that is done the progeny of selected and pedigree bulls supplied to rural areas for improving the breed will either die of starvation or deteriorate. As I have already mentioned, the co-operative organisation is the best agency through which all kinds of village improvements can be introduced. The co-operative workers will be able to do all the propaganda and preaching and will succeed in convincing the village people of the evil of breeding from unfit animals and the benefit of breeding from selected bulls. These workers can also induce the cultivators to grow fodder crops for feeding their improved cattle, and to castrate all unfit bulls.

(ii) The betterment of the dairy industry can best be effected by increasing the supply of fodder crops. Until the village people can be induced to grow fodder crops, this will not be possible. We cannot induce the ordinary cultivators to grow fodder crops until we can prove to their satisfaction that fodder growing will be a paying business. Through the endeavours of the central co-operative organisations and co-operative workers the members of societies close to towns can be induced to grow fodder crops and to keep good milch cows. There is a market in the town for the milk: the return they will get by selling milk in the town will encourage them to keep more milch cows and to grow more fodder crops.

Cultivators living in villages far away from towns can also be induced to grow fodder crops if the district boards and municipalities can be induced to provide transport facilities and market the fodder for the use of the *gowalas* and other cow-owners of the town. The railway companies can also help the transport of the fodder crop to those areas where there is a demand by fixing a flat rate to any distance within five hundred miles or so.

(*b*) (i) and (ii). Both these causes have contributed to the deterioration of cattle in our district. The remedy lies in educating the village people to improve the common pastures. If all the plough cattle of the village were employed to plough the grazing lands in season and good grass seed were sown, it would help greatly to diminish the inadequacy of pasture lands.

(iii) This insufficiency can be met by importing fodder from places where there is an abundance. This will only be possible when railway freight is reduced.

(iv) This drawback can only be reduced by inducing the cultivators to grow fodder crops in the rainy season and store them in silos for use in the dry season.

Cultivators can be induced to grow fodder in the dry season under irrigation for feeding their milch cows if they find a market for the milk and milk products and if the business proves to be a profitable one.

Babu Tara Prasanna Ghose.

(*c*) Fodder shortage is most marked in our district from February to June. After about four to six weeks cattle begin to thrive.

(*d*) Either by encouraging the cultivators to grow fodder crops on a large scale or by importing fodder from districts where it is in abundance.

(*e*) Landowners could be induced by the district officers to start model dairy farms on their own lands. They may be encouraged by the Government by the offer to pay the cost of an expert manager and the arrangement of the sale of the dairy produce.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) In Chota Nagpur, where the cultivators grow one crop only, the number of days an average cultivator works on his holding during the year is about one hundred, whereas in Bihar where the cultivators grow two crops, it is about two hundred days. In the slack season if he finds work he works as a day labourer; otherwise he spends his time in idleness. If agriculture could be intensively developed in India the cultivator would scarcely find time to do any other work.

(*b*) The first thing to be done is to arrange for the marketing of the products of the subsidiary industries to be introduced in rural areas. If these industries bring more money into the pockets of the rural population there will not be much delay in adopting them.

All the subsidiary industries mentioned in Question 17 (*c*), can be adopted to occupy the spare time of the family, if the Government will engage experts to teach them to the village people and also arrange for the marketing of the products.

(*c*) The obstacles in the way of the expansion of these industries are, want of propaganda and preaching for the introduction of such industries in rural areas and also want of proper training of the rural population to make them fit for taking up such industries. In Indian villages people of different castes and religions dwell; so there will be no difficulty in introducing different kinds of industries among men of different castes and of different religions. The Mahommedans, Christians, low caste Hindus and aboriginals can take up poultry-rearing, sericulture, lac-culture and improved tanning. On the other hand the Hindu cultivators can take up bee-keeping, fruit-growing, market-gardening, pisciculture, rope-making, basket making, toy-making, dairying, etcetera.

(*d*) Yes; it is very necessary.

(*e*) It is not desirable that industrial concerns should move to rural areas.

(*f*) Yes; it is necessary.

(*g*) The construction of roads and *bunds* and digging of tanks, canals and wells in rural areas.

(*h*) This can be done by educating the rural population by means of preaching and propaganda to understand the benefit of better sanitation in their villages. If a right type of co-operative society is organised in a village, people can easily be induced to work jointly to improve the health condition of their own environments. In some of the villages of Khunti sub-division where there are the right type of co-operative societies the people have improved the sanitation of the village by filling up ditches, clearing bushes, improving drainage and digging wells for the supply of good drinking water.

QUESTION 18.—AGRICULTURAL LABOUR.—(*b*) There is much shortage of agricultural labour in Chota Nagpur which is a very thinly populated country. Shortage is also due to the fact that labour is extensively recruited from Chota Nagpur for tea gardens in Assam, Darjeeling and

the Jalpaiguri districts of Bengal. The remedy lies in stopping, by legislation, all recruitment of labour from the Chota Nagpur area, where on account of the shortage of agricultural labour the country is not developing.

(*c*) There are vast areas of waste lands in Chota Nagpur. The landlords of the villages will be glad to settle these lands on surplus labourers who will come to settle down in the country. The landlords will be willing to settle these lands free of rent for three years, within which period the lands will be reclaimed and made fit for cultivation, and after this period on the condition of paying rents at prevailing rates. Government should help this surplus labour to migrate by arranging free railway passages and making some temporary housing arrangements in areas where the surplus population is going to settle. The labour should also be financed by the Government through co-operative societies organised in this colonised area for reclaiming their lands. The rate of interest to be charged by Government should be as low as possible.

QUESTION 19.—FORESTS.—(*a*) In Chota Nagpur, where there are forest lands in villages or in neighbouring villages cattle are allowed to graze on them. When the trees (generally *sal*) are big enough cattle can do them no harm. The cattle only eat the shrubs and grass growing in the shade of these trees. Where these *sal* trees are not allowed to grow big and are cut after every three years, the cattle should not be allowed to graze on these lands as they will eat up all the young shoots coming up from the stumps of old trees and will thus do damage to the forests. When the village people are not careful enough in guarding their forest lands, in which new shoots are coming up, against the grazing of cattle the forests gradually are destroyed and deforestation increases.

I may mention here that in Chota Nagpur rapid deforestation is going on since the last settlement operations about twenty years ago. In the settlement records the rights of the landlords and tenants on forest lands were not clearly defined. Formerly the zamindars were the sole owners of the village forest. The tenants were allowed only to collect dry wood from the jungles for fuel. For building their houses, etcetera, the tenants had to get the permission of the landlord to take the necessary quantity of timber from the jungles. At the last settlement the tenants were given the right to take timber from the jungles for these purposes without the permission of the landlord. After the granting of this right the tenants began to cut trees on the plea of re-building old or building new houses and a regular competition began amongst them as to who could cut most trees from the jungles. The landlord became helpless against this wanton destruction. The criminal courts would not entertain any application from the landlords against the tenants for cutting trees from the jungles, as according to the settlement records the tenants had the right to cut trees, and where these courts upon the applications of the landlords summoned the tenants, at the time of the trial they were always found to take the side of the tenants. As the whole village generally combine against the landlord when he brings tree-cutting cases against a tenant, it becomes very difficult for the landlords to prove that the tenant has not cut these trees with the intention of building or repairing his house. What the tenants actually do with the trees which they cut from their village jungles is to sell them secretly to the inhabitants of villages having no forest. When the landlords found it very difficult to save the forests from destruction even by appointing forest guards, they themselves began to cut the trees and sell them. Thus the deforestation of Chota Nagpur is progressing very rapidly. Until the rights in

forest lands are clearly defined neither the tenants nor the landlords care to preserve the forests of the villages. I may suggest here that by legislation a portion of the village jungle should be given to the village tenants. They should have the right only to cut trees from one part of the jungle for building houses, etcetera, and should have no right to take timber from the landlord's portion of the forest lands. Both the parties will then look after their own share of the forest lands and the wanton destruction of forest in Chota Nagpur may then cease.

(*b*) The supply of firewood in rural areas may be increased by afforestation or by planting quick-growing trees on waste lands and as hedges. Systematic afforestation will also help to improve the fodder supply inasmuch as forests help to keep the moisture in the soil, so that grass and shrubs can easily grow. As I have written elsewhere, by inducing the village people to grow fodder crops the supply of fodder can also be increased.

(*c*) There is no doubt that deforestation has led to soil erosion. Afforestation will prevent soil erosion and damage from floods, but this cannot be done quickly. Another remedy is to construct systematic high-level *bunds* all over the Chota Nagpur plateau. [See Question 8 (ii)]. High-level *bunds*, as I have already stated, will stop erosion and damage from floods, and by bringing moisture to the soil will also help afforestation.

(*e*) In Chota Nagpur there is no dearth of waste lands which formerly were under forests, and a portion of these can again be converted into forest lands. In a co-operatively organised village the village people could be induced jointly to plough such lands in the beginning of the rainy season and sow *sal* seeds on them. They should also guard the area for three or four years and prevent cattle from grazing away the young plants.

(*f*) See Question 19 (*a*) and (*c*).

QUESTION 20.—MARKETING.—(*a*) and (*b*). I do not consider the existing marketing and distributing system at all satisfactory. Agricultural produce passes through the hands of several middlemen before reaching the consumers. By organising co-operative sale societies in rural areas for the joint sale of cultivators' produce to wholesale dealers or to consumers like the co-operative societies for joint purchase and distribution organised in urban areas, marketing can be much improved; growers will get better value for their produce, while wholesale dealers and consumers will get better stuff at a lower price. But until cultivators can be properly trained to manage such sale societies it will not be possible to make them successful. Honesty and loyalty on the part of the members are also absolutely necessary. Many such societies organised for the joint sale of cultivators' produce in this Province have sadly failed to achieve their object for want of honesty on the part of the members and inexperience in business management on the part of the managing committees. I say from my personal experience that the low moral standard of the cultivators themselves is standing in the way of all their progress. Until the moral standard of the rural population is improved and they are taught to manage the business of joint sale, they will have to depend upon the middlemen for marketing their agricultural produce.

QUESTION 22.—CO-OPERATION.—(*a*) (i) The present type of village co-operative society organised to grant cheap credit has not done much to improve the economic condition of the village people. That rural indebtedness is due to the oppression of the rural population by the unscrupulous village *mahajan* is an altogether erroneous idea. The root cause of the miserable condition of the majority of the rural population is their diseased minds. During the long period of decadence

through which India has passed the moral standard of the rural population has much deteriorated. Until their diseased minds are properly treated and made healthy and robust, until their moral standard is raised, all attempts to improve the economic condition of the rural population will be fruitless. Moral development must precede all economic developments. Without moral support all economic developments if partially achieved will come to naught at no distant date. I have therefore pointed out in my paper* entitled "The Village Welfare Society", hereto attached, that, in the first place, our co-operative societies for rural development should be hospitals for treating the diseased minds of the members and, in the second place, they should be schools for educating the minds of the members to broader and nobler ideas. By these two processes, if we could arouse in the minds of the members the true spirit of co-operation, a real spirit of fellowship and universal brotherhood and an awakening of love for, and service to, their neighbours and humanity at large, half the battle would be won.

I call this type of society "The Village Welfare Society" a society organised with the aim of doing the greatest amount of good by improving and educating the minds of the members with broader, nobler and newer ideas. I say therefore from my fourteen years' experience in co-operative work in villages that if we want to promote the welfare and prosperity of the rural population, a village welfare society of the type I have discussed in detail in my paper should be organised in every village. The whole of the village people, rich and poor, high and low, educated and uneducated should be induced to join such a society. This can be achieved by carrying on persistent preaching and propaganda in the village and arousing a spirit of co-operation by really earnest and sincere workers. The educated public in India should be aroused to a sense of their duty towards their unfortunate brethern living in the villages by the carrying on of preaching and propaganda amongst them by influential officials of the Co-operative Department. A central co-operative federation should be organised in each Province, with district co-operative federation boards as branches at each district headquarters, with joint efforts of the official and educated public. These institutions should take up the work of organising village welfare societies all over the country by maintaining a sufficient number of paid and honorary organisers. These co-operative workers should first visit the villages as missionaries for preaching the gospel of co-operation; they should in no way give the villagers any opportunity of thinking they are big people, but should mix very humbly and freely with the rural population in order to win their hearts. If they can once succeed in gaining their confidence everything will be simplified and the path of progress will be made very smooth. They will be able to organise a village welfare society by inducing the whole of the village people to join such a society for the well-being and prosperity of the rural population. Once the whole village is co-operatively organised it will be easier to improve the agriculture of the village through the influence of the co-operative workers in the area, who have already gained the confidence of the rural population, by inducing first the intelligent and solvent section of the village people to use selected seeds, improved manures and implements and to grow more remunerative crops. Once it is demonstrated in the village that improved methods of agriculture bring more money to the pockets of the cultivators, the cultivators will readily adopt them.

Similarly, better methods of sanitation can also easily be introduced in a co-operatively organised village: the minds of the people should be prepared beforehand by the preaching of the co-operative workers; they will therefore adopt the new methods easily and by their joint

* Not printed.

Babu Tara Prasanna Ghose.

action will improve the health conditions of their village by proper drainage, by clearing jungles, by digging wells for the supply of good drinking water, by taking precautionary measures in times of epidemics, arranging for medical help and doing such other work as will improve the sanitary conditions of the village.

For want of funds Government has not been able to make adequate arrangements for the spread of primary education in rural areas. When the village is co-operatively organised and adult members are educated up to an appreciation of their village needs by preaching and propaganda carried on by the co-operative workers, they will then exert themselves to establish primary schools in their villages by collecting subscriptions for paying part of the salary of the *guru* and by giving free labour for building the schoolhouse.

In such villages it will be possible for the Department of Industries also to introduce, with the help of the co-operative workers, a new class of cottage industries and also new methods and appliances for improving the dying industry of the country.

In a co-operatively organised village the moral atmosphere will also improve. There will be less litigation, which is one of the main causes of rural indebtedness, as disputes will be amicably settled by the village *panchas*. The drink evil, which is doing so much harm to the country, will also gradually disappear.

The Government should help the growth of the co-operative movement by granting suitable subsidies to these district co-operative federations through the central co-operative federations to meet the cost of maintaining a sufficient number of organisers for rapidly multiplying the number of village welfare societies within the district. Of course, the district federation will also take the help of the right type of honorary workers to do this work. Until the educated public and leisured classes come forward to help the movement it will not be possible either for the Government or for the federation to maintain a sufficient number of paid organisers to carry on the work of organisation rapidly.

After these village welfare societies are organised, a properly trained staff for guiding the members of the societies to do village reconstruction work for improving the economic condition of the village people will be necessary. At present the work of the credit societies in the villages is supervised by the inspecting staff of the Central Banks which finance these societies; about forty societies are placed in charge of each inspecting clerk; these clerks visit the societies simply to help the *panchas* to realise instalments of loans and interest from the members and from the societies due to the Central Banks. They give no time to educating the minds of the members with newer and nobler ideas nor do they think of, or help in, solving their economic problems. This class of work is not of the kind which will make the village welfare societies successful. I am of opinion that the inspection and guidance of such societies should not be entrusted to the staff of the Central Banks. The district co-operative federation should maintain a sufficient number of village workers properly trained for looking after these village welfare societies. They must have an elementary knowledge of agriculture, veterinary and sanitation; they should also have some knowledge of improved methods in cottage industries and of co-operative principles and accountancy. These workers should not be given more than ten societies each to look after. If intensive development of the village is to be done these workers will have to give more attention and time to the village: if too many villages are given to them the quality of the work will be bad and there will be very little progress towards real development of the rural areas.

The reasons for my suggesting that the village welfare societies should be placed under the supervision and guidance of properly trained village workers maintained by the district federation board are: firstly, when the whole village is co-operatively organised it will not be necessary in many cases to take loans from any outside agency to finance needy members; the well-to-do sections of the village community will willingly deposit their savings in their village society bank to meet the needs of their needy brethren. It is natural therefore that the Central Banks will not care to look after societies which will not borrow anything from them. It is generally the case at present that those credit societies which have paid up their dues to their Central Banks are never properly looked after by the inspecting staff of the banks. Secondly, by placing the village societies under the supervision of the Central Banks the village societies will be converted into simply loan institutions. The banks will only care to realise their own dues from these societies as they are doing now from the credit societies, and, so long as their money remains invested in these societies, will see which individual member is not paying his *kists* and interest, simply for this reason, that if these are not realised the banks' own dues from the societies will fall into arrears.

The Central Bank should serve the purpose of a financing agency and nothing else. When the village societies apply to them for loans they should send their manager to the villages to find out the assets and general condition of the societies. On this enquiry, the banks will decide how much they can advance and will advance such an amount as they think they can safely advance to the societies.

From my long experience of the co-operative workers I can say that by placing the societies under the guidance and supervision of the Central Banks, they have been much demoralised and not much has been achieved towards the well-being and prosperity of the rural population. The relations between the Central Bank and the societies are as between creditor and debtor; the creditors are always a powerful body, invariably more selfish and seldom hesitate to sacrifice the interests of their debtors to their own interests. I have pointed out very clearly in my paper entitled "The Village Welfare Society" how the majority of the Central Banks take advantage of their affiliated societies.

It is absolutely necessary, therefore, to place the village welfare societies under the supervision of the trained co-operative workers to be maintained by the district federation boards. The Government should grant a sufficient subsidy to the district federation board, through the central co-operative federation, to maintain such a staff, the pay of each worker being not less than fifty rupees per month. The Central Banks, which will not have to maintain staff under this scheme for the supervision of the societies, should contribute handsomely from their profits towards the cost of maintaining the trained supervisors of the district federation board or should greatly reduce the rate of interest on the amounts granted to the societies as loans. In the latter case the societies will gladly contribute their quota towards the fund for maintaining these supervisors.

For the purpose of training the above mentioned co-operative workers (organisers and supervisors of societies) and also managers of banks, an institution should be established by the Government, the cost of running which the Government should meet. All the development departments of the Province, *viz.*, Agricultural, Industries, Sanitation, Education and Forest, should lend their experienced officers to this institution to train the workers in the elements of the subjects of their respective departments. The institution should be placed under the

Co-operative Department, as all the improvements will have to be introduced by co-operatively organising the village by co-operative workers. The experienced officers of the department will give training in co-operative principles, practice and accountancy. The cost of audit of the village welfare societies should also be borne by the Government.

(ii) I have already mentioned, in reply to Question 22 (i), that without the help of the non-officials, that is the educated public and leisured classes such as zamindars, the co-operative movement cannot advance very far by entirely depending on the activities of the officials. The central co-operative federation and the district federation board will be non-official bodies which will get an adequate subsidy from the Government. These bodies, by carrying on preaching and propaganda amongst the educated classes, will try to attract the services of as many honorary workers as possible to supplement the number of paid workers. They can also collect funds for carrying on village welfare work by appealing to the country on the ground that on the prosperity of the rural population depends the prosperity of the whole country, as they are the real producers of wealth.

The Servants of India Society and the Young Men's Christian Association have done much for the growth of the co-operative movement. Other social service societies and missionary bodies, if interest is created among them for co-operative work, can do a lot by taking charge of the supervision of certain groups of societies. With their help the trained supervisors of the societies will be able to manage more societies than ten and the progress will be rapid.

Non-official bodies such as district boards and municipalities can also help the growth of the movement by arranging to facilitate transport to urban areas for marketing the products of the rural societies and also helping in the distribution of the same. District boards, by arranging to train the *gurus* of the primary schools in co-operative principles and practice can greatly help the movement.

Village *gurus* (teachers of primary schools) generally have much influence over the village people. If they are properly trained in co-operative work they will be able to create a spirit of co-operation amongst the village people and the boys of the school, and will be able to introduce considerable improvements in the village with the help of the co-operative efforts of the village people.

As district boards are also interested in rural development, these bodies should grant a suitable subsidy to the district federation board for the expansion and development of village co-operative societies in the district because, as I have already said, rural areas can best be developed through co-operative organisation in villages.

The unspent balance with the district board can be granted as long-term loans at a low rate of interest to the Central Banks for advancing to the individual members, through their respective societies, for digging wells, excavating tanks, constructing *bunds*, reclaiming waste lands, et cetera, and at a low rate of interest.

District boards can also help the co-operative movement by giving monetary help to village welfare societies for constructing buildings for grain *golas*, purchase and sale depots, seed, manure and implement stores.

The district boards should make it a rule to start schools in those villages which are co-operatively organised and where the village people have shown their keenness for education by raising subscriptions in their village for paying part of the *guru's* salary, by giving free labour to construct the schoolhouse, or by giving land free for the school.

The district board, where possible, should give the contracts for roads, wells and village school buildings to the nearest co-operative societies.

(*b*) (i) I am of opinion that the present type of credit society is not worth multiplying. I have shown their defects in the paper entitled " The Village Welfare Society ". Until the rural population is educated to broader and newer ideas by the means already stated in reply to Question 22 (*a*) (i), mere credit societies will not be of much help in improving the well-being and prosperity of the rural population.

(ii) to (vii) In my opinion all these types of societies can wait for the present. We should concentrate all our endeavours on making village welfare societies successful. After the village welfare societies are properly established they will be able to do the work of these types of societies by organising different groups and it will not be necessary to organise different types of societies in one and the same village, unless the village is a very big one.

(viii) For improving the breed of cattle it will not be necessary to organise a separate society. Village welfare societies should be supplied free with good breeding bulls from the Government cattle-breeding centres.

(ix) The village welfare society is a society for the betterment of village life and its aim is also to improve agriculture, without which it will not be possible to improve the economic condition of the rural population in India. Much has already been said about this type of society.

(*c*) I am not in favour of compulsion if things can be done by persuasion. Matters will greatly improve after the village welfare societies are properly organised and firmly established there. Yes, I do not think there is much harm in introducing legislation to compel unwilling persons to join co-operative schemes for joint improvement for the common benefit.

QUESTION 23.—GENERAL EDUCATION.—(*a*) The present system of education has changed the mentality of the Indian people in such a way that they look down upon agriculture as a degrading profession. The present system of education in no way helps to increase the agricultural efficiency of the people.

(i) In high schools and colleges, agriculture should be introduced as a subject for study. Those students who will take agriculture as their subject, in addition to the study of books on the subject, should be taken to the nearest farm to learn the principles of agriculture by direct observations. I may also suggest that for those students who will take agriculture as their subject in the high schools arrangements should be made to give them practical training in agriculture in a demonstration field attached to the school.

In high schools and colleges, the percentage of the sons of cultivators is very small. The introduction of agriculture as a subject in high schools and colleges will help to change the mentality of the sons of the middle and landowner classes who generally go to these institutions for study, and in creating an interest amongst them for agriculture. Some of them, possibly, after finishing their education will want to specialise in the subject of agriculture and will join agricultural colleges to be established in each Province, for getting higher theoretical and practical knowledge in the subject. From the graduates of these agricultural colleges officers of the provincial agricultural department should be recruited.

Babu Tara Prasanna Ghose.

(ii) In middle schools agriculture should be a compulsory subject. A small demonstration farm should be attached to each school where the boys should be made to work and to learn practical agriculture.

(iii) In elementary schools, teaching should be based on agricultural and rural needs. Nature study should be made compulsory. On small plots within the school compound boys should be taught to plant trees, grow vegetables, et cetera.

(*b*) (i) Rural education should be based on agriculture and rural needs. This will improve the ability and culture of agriculturists, while retaining their interest in the land.

(ii) I am not in favour of compulsory education in rural areas. After the village welfare societies are organised and firmly established the cultivators will learn the value of educating their children and will establish schools for educating them.

QUESTION 24.—ATTRACTING CAPITAL.—(*a*) Government should establish farms on purely commercial lines and, by successfully working such farms, prove that capital invested in agriculture will bring a fair return.

(*b*) It is not clear what is meant by "owners of agricultural lands". If it means the landlords, the reason for not carrying out improvements is that the capital they might invest in improving the land, by constructing *bunds*, et cetera, would bring no return to them although the investments might greatly improve the land of the tenants. The tendency of the revenue officers is not to allow a fair enhancement of rent to the landlord for making these improvements, although in Government *khas mahal* villages where tenants' lands were improved by constructing irrigation tanks, *bunds*, et cetera, the rents were enhanced. If "owners of agricultural land" means ordinary cultivators, the reason for not making any improvement of their lands is that in Chota Nagpur they are debarred by law from freely transferring their lands and therefore there is little chance of their getting back the capital invested, if at any time they so wish, by selling their improved land.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) Please refer to my paper entitled "The Village Welfare Society". During the long period of decadence the rural population of India has undergone much moral degradation. Until we can succeed in improving the moral standard of the rural population no scheme for improving the well-being and prosperity of these people will succeed.

I have suggested in my paper referred to above that both the moral and economic development of rural areas can best be effected by organising a village welfare society in every village and carrying on the work of such society on the lines indicated in my paper. This will help to change the mentality of the people and we shall have better sanitation, better agriculture, better medical help, better education and a better moral atmosphere in the villages.

(*b*) Yes, I am in favour of this, but in conducting the survey the Government officer deputed to do it should take the help of the co-operative workers of the area, for no one knows better the condition of village people than these workers.

(*c*) The scope of enquiry should be to find out the extent of the cultivator's holding, annual yield from his land, cultivation expenses, subsidiary income from any other source, number of members in his family, number of his cattle, amount of his daily household expenditure, amount of annual expenditure on wearing apparel, amount

of his indebtedness, the rate of interest at which he has to borrow cash or grain, amount of rent he pays to the landlord, amount of his expenditure on marriage, *sradhs*, and litigation.

This enquiry can best be done by taking the help of co-operative workers of the area, referring to the *haisiyat* registers of the members kept in co-operative societies and to the settlement records of the villages.

In the course of my co-operative work in villages I studied the economic condition of cultivators in a few typical villages of the Ranchi district; my enquiry revealed that the condition of the rural population of that district is most deplorable; for about six months in a year the people live on half rations; they even have to live on leaves of trees. Their cattle also starve from March to July where there are no forest lands.

Oral Evidence.

67,657. *The Chairman*: Babu Tara Prasanna Ghose, you are a zamindar of Ranchi?—Yes, and a cultivator also.

67,658. What is the extent of your zamindari tract?—I have some thirty villages in the Ranchi district.

67,659. Do you farm any land yourself?—Yes.

67,660. How much land do you farm?—About fifty acres.

67,661. Home farm?—Yes.

67,662. By means of day-to-day labour?—No, I have some permanent servants and I also hire some day-to-day labourers at busy seasons.

67,663. As you have been listening to the evidence of previous witnesses, you have probably heard a good deal about zamindars not taking an active interest in progressive agriculture, or indeed in agriculture of any sort. What do you say about that point? Do you think that the charge is valid, that the zamindars do not take any interest as a whole?—That is so.

67,664. What made you take an interest?—Before I acquired the zamindari I started a farm because I have been very keen on agriculture. I acquired some 400 bighas of land at Kanke where they now have the Government farm, but which did not exist at the time. After finishing my general education I went to Ranchi for a change, and then settled down as a farmer there. For want of proper experience I lost heavily in the beginning, but that did not deter me from pursuing agriculture, because I still had hopes. I have since acquired some property in the interior.

67,665. Have you any sons?—Yes.

67,666. Are they going to take an interest in agriculture just as you have done?—Yes; they are now reading—the elder one in the Science College at Patna.

67,667. Do you wish them to take an interest in agriculture?—Yes, I intend to send one of my sons to study scientific agriculture in foreign countries.

67,668. I suppose a good many of your personal friends are brother zamindars?—Yes.

67,669. Can you help the Commission by suggesting some means which might be taken to encourage and stimulate zamindars to take an interest in progressive agriculture, namely, management and so on?—I can only suggest propaganda work, preaching and demonstration.

Nothing has been done amongst them in that respect. Proper education is also necessary.

67,670. Do you think that anything in the nature of a provincial agricultural society might attract them?—I hope so.

67,671. I want to know whether you think so yourself? Do you think there is really any hope of stimulating interest amongst zamindars by means of an agricultural society?—They can be induced to join the society.

67,672. Does the ordinary zamindar who takes no interest in agriculture never go out into the countryside at all? Does he spend most of his time in his house?—The petty zamindars take some interest, but the big zamindars generally do not remain in the villages, but live in the towns and so do not take any interest.

67,673. They are absentee landlords?—Yes.

67,674. Would you have any objection to a son of yours learning, as a boy, to handle the plough, the seed drill and implements of that sort?—Not in the least.

67,675. You think there is no more honourable occupation than that?—I have done the same thing.

67,676. You have ploughed?—Yes; I have no objection to ploughing.

67,677. I appreciate the argument which you present in answer to Question 1 on page 374, as to the Central Government undertaking all research. I see what you mean. But I imagine that you will be prepared to agree that although essential research might be carried on by the Central Government a great deal of experimental work would have to be carried on in the Provinces?—Certainly; experimental farms will be conducted in the Provinces.

67,678. Have you studied the marketing conditions in this Province?—A little.

67,679. When the cultivator takes his share of the produce to the market to sell it for cash, do you think that he gets a fair share of the value?—The greater portion goes to the middleman.

67,680. Do you think if it were possible to regulate market practices, to provide markets where the machinery of marketing would be controlled, where neutral tallymen would be licensed to weigh or measure the produce, that would be an advantage to the cultivator?—I do not exactly understand the question.

67,681. When a cultivator takes his grain or his produce (whatever it may be) to the market, he sells it to a middleman?—He sells it to a *paikar*.

67,682. Is he a commission agent?—He is not a commission agent; he is a middleman.

67,683. Who does the weighing?—Generally the *paikar*.

67,684. Is there any guarantee that the cultivator is getting a fair measure?—No.

67,685. If the operation could be carried on by a neutral tallyman, would not that be a great advantage to the cultivator?—Certainly.

67,686. And so on through the whole business of marketing?—Yes.

67,687. Do you think that better marketing would have an important effect on the producer in giving him confidence that where he could produce better quality he would get the value of that better quality?—Certainly.

67,688. Would you agree that better marketing is very closely associated with better communications?—Yes; I have stated that in my note.

67,689. You are fully aware of that?—Yes.

67,690. In answer to Question 4 (*c*) (iii), I see that you advocate the establishment of a central road board for improving the transport facilities. I wonder whether you have considered the financing of the road system that you are advocating?—I have not considered the financial aspect of it.

67,691. It is always a knotty point when one has to look for money, is it not?—Yes.

67,692. You say, in answer to Question 18 (*b*), that there is much shortage of agricultural labour in Chota Nagpur, and you want to stop all recruitment of labour in Chota Nagpur for the tea gardens. Do you think that is quite fair to the labouring classes?—Until the tract is developed all recruitment should be stopped; it is better that they should remain there until the tract is developed.

67,693. I quite see that it is awkward from an employer's point of view that there should be scarcity of labour, and I dare say there is something in the notion that an undeveloped tract is likely to be made the slower in its development by the absence of sufficient labour; but, from the broad point of view of Government, do you think it is a practical suggestion that the men should be prevented from selling their labour in the best market?—You cannot prevent any one.

67,694. You cannot prevent the labourer from selling his labour in the best market?—I agree.

67,695. You say, in your answer to Question 19 (*a*), that you are anxious that Government should provide a clear statement of the exact conditions on which cultivators are entitled to grazing and other rights in the forests. In your experience, there is some uncertainty in the matter?—Yes.

67,696. You give your views on co-operation. Do you agree that, in the main, there is a lack of healthy activity in the primary societies in this Province?—Yes; that is my opinion.

67,697. What exactly are your objections to compulsory education?—I am in favour of persuading the people. By adult education, by organising societies of the right type, you can educate the people, and when they are educated they will themselves send their children to school.

67,698. But has it not been the experience of all progressive countries that there comes a moment when the principle of compulsion must be introduced and accepted?—Yes.

67,699. In answer to Question 25 (*c*), you are talking about conditions in the Ranchi district, and you say: "my enquiry revealed that the condition of the rural population of that district is most deplorable; for about six months in a year the people live on half rations; they even have to live on leaves of trees". How is it that these people do not go for employment to districts where their labour is in demand?—They do not generally like to leave their hearth and home.

67,700. Is not the habit of emigration fairly well established in Bihar and Orissa? Are the people about Ranchi aborigines?—They are.

Babu Tara Prasanna Ghose.

67,701. They are not prone to emigrate?—Some of them emigrate, but the majority do not like to leave their homes.

67,702. *Professor Gangulee*: Are you referring to any particular people or to the rural population of the whole district?—I refer to the rural population of the whole district.

67,703. Who are they?—Most of them are aborigines.

67,704. *The Chairman*: In your note on "The Village Welfare Society", you say that a considerable part of the economic backwardness of the people is due to litigation. Is a great deal of money spent on litigation?—Yes.

67,705. Have you any remedies to suggest?—I have suggested remedies in my note.

67,706. Would you attempt the experiment of arbitration conducted by co-operative societies?—Yes; I am doing it myself.

67,707. With what success?—With great success.

67,708. *Professor Gangulee*: Could you give us an idea of how many cases you arbitrate upon?—Almost every month I decide one or two cases. When they are in trouble they come to me, and I go to the village and settle matters. Only recently I went to one village and settled a dispute there. When there is a non-member or a landlord I try to induce him to agree to arbitration, but if he does not I take the Sub-Divisional Officer with me and through his influence I settle the cases.

67,709. *The Chairman*: In cases where you settle by arbitration, have you seen any tendency on the part of the unsuccessful party to fall back on the law, or do they accept the finding of the arbitrator?—They accept the finding of the arbitrator.

67,710. Who are the arbitrators: the *panchas* or individuals?—The *panchas* also arbitrate; but generally someone from the central organisation of the co-operative moment.

67,711. *Sir James MacKenna*: You are in favour of starting village welfare societies; have you started any of these in your district?—Yes.

67,712. How many?—Several.

67,713. Are they coming up to your expectations?—Yes. I have cited the instance of one of the societies; that is a model society. Other societies are also run on the same lines, and they are taking up the improvement of sanitation, agricultural improvement, building of small schools, etcetera. All my societies are like that.

67,714. Is your whole time taken up by this work?—Yes; in fact I do not find time to look after my own cultivation; I depend upon my servants for it.

67,715. Had you any agricultural experience before you took up this work?—As I have stated, I started a farm in 1904, of about 130 acres.

67,716. You had a good deal of capital before you started that?—I had some capital.

67,717. You had sufficient capital?—Yes. I learned progressive agriculture in the Kanke farm, where the Deputy Director (Mr. Dobbs) had introduced good varieties of sugarcane and groundnut.

67,718. I suppose you admit that, in starting an experiment like yours, adequate capital is the main need?—Yes.

67,719. You could not stand for the first two or three years without capital behind you?—No.

67,720. *Professor Gangulee*: Could you tell us what is the secret of success of the co-operative movement in the Khunti sub-division?—Propaganda and preaching.

67,721. Through what agency?—Practically, I do it myself, and also the Assistant Registrar of Co-operative Societies, Mr. N. K. Roy.

67,722. Is it propaganda through non-official agency?—Yes, and partly through official agency. Mr. Roy was of very great help to me.

67,723. Could you tell us why similar co-operation between the officials and non-officials is not to be seen elsewhere?—Proper propaganda has not been carried on among the urban population. I think many people do not know what the co-operative movement is.

67,724. Precisely. In the Khunti sub-division you have shown what could be achieved by this propaganda?—Yes.

67,725. How is it that this success has not been taken as a model in other sub-divisions?—They are gradually doing it now. I am one of the directors of the Ranchi Bank. Having failed to convince the other directors of the soundness of my ideas, I organised a new bank at Khunti with the help of the officers of the department and by persistent preaching and propaganda, succeeded in organising village welfare societies. In that way, I carried out my idea, and now the department is encouraging these banks to take up work on these lines.

67,726. In the case of the village welfare societies that you have established, what assistance did you receive from the Co-operative Department? Did they supply the men for propaganda, or did they establish banks?—I am the honorary organiser of co-operative societies for that area, and I organise the societies.

67,727. Have you received any assistance from the Agricultural Department?—Yes, they have co-operated with us whole-heartedly.

67,728. Did you receive any assistance from the Education Department?—Not much, but we have received a block grant from the district board.

67,729. Did you receive any assistance from the Public Health Department?—Nothing up till now.

67,730. What is the attitude of the district boards and other local bodies towards your village welfare societies?—They are practically not taking much interest in the co-operative movement.

67,731. I was not referring to the co-operative movement as such, but to the village welfare societies that you have established. What is the attitude of the district boards towards them? Is any assistance received from the district boards or other local bodies?—No.

67,732. You say that the youths of the middle class are anxious to go back to the land?—Yes.

67,733. Do you make that statement from observation? Do you know of any Behari young man anxious to go back to the land?—There are several. I cannot say if the whole lot are anxious, but many Bengali youths come to Chota Nagpur to settle there.

67,734. What is their difficulty? Lack of capital?—Yes.

67,735. And also lack of knowledge?—Yes; knowledge is the main thing. There is capital in the country, but there is lack of knowledge. Therefore, I suggest that demonstration farms on commercial lines should be started by Government for teaching these youths. I had that difficulty when I started my farm; there was no place for learning agriculture.

Babu Tara Prasanna Ghose.

67,736. We are told that the Kanke system of irrigation is very popular amongst the villagers. Is that a fact?—We are just trying to introduce it; we have just begun propaganda work for that. Recently I had been to two villages, and I have induced the villagers to have high-level *bunds*, as they have in *khas mahal* villages, which will greatly help in converting a big area of waste lands into paddy fields.

67,737. Did you actually establish a society there?—The members of my welfare society will do it. In one of the two villages visited there is a village welfare society and in the other a new society on the same line has been organised. Everything will be done by these people, agricultural improvement, sanitation, education, etcetera, and when you organise a whole village you can educate the people to new ideas, and they will take them up. Of course, it is very uphill work in the beginning, but once you gain their confidence, it is very easy.

67,738. How many men have you to assist you in your work?—There is the manager of the bank and three inspecting clerks, and there are also the guaranteeing union clerks.

67,739. These people assist you in your village welfare society work?—Yes. I do the propaganda to induce the people, and then the men I have mentioned carry out the work.

67,740. You say "The root cause of the miserable condition of the majority of the rural population is a diseased mind", and at the same time you do not advocate compulsory primary education. Could you tell us how you are going to cure this diseased mind?—The co-operative society is the school; it will educate the village people, and it is the best place for educating them.

67,741. *Mr. Kamat*: There is a suggestion in your note that the Veterinary Department should enlist the help of the milkmen, the *gowalas*, who should be trained so that, with their help, you could win the confidence of the other village people in the matter of inoculation and such like new methods. What is your actual solution?—The Agricultural Department has trained some *kamdars* of the cultivator class. So also, the Veterinary Department should train some *gowalas* in veterinary work such as inoculation. These people, with the help of the co-operative workers who have gained the confidence of the people, visit the villages and inoculate the cattle. No objection will be raised to it then.

67,742. The *kamdars* are paid men of the department?—These trained *gowalas* will be paid by the department or by the district boards. Even the banks can employ them.

67,743. The *gowalas* should be trained and should be kept as paid men in the department?—Yes. They should be kept as *kamdars*, because there is not sufficient staff to do the work, and these people can be engaged on a small pay.

67,744. You also make a suggestion that there should be a sort of training school, where subordinate members of the various services, Co-operative, Agricultural, Veterinary and Forest, should be brought in with a view to give them ideas about propaganda and such like things. Will you enlarge upon that suggestion of yours?—That is for training village co-operative workers, for organising village welfare societies and for supervising. That is my idea for starting a training college. The officers of these departments should be deputed to teach them.

67,745. The officers of which departments should be brought to the school?—The officers of the Agricultural, the Public Health, the Veterinary, the Forest and Co-operative departments.

67,746. So that each man, when he goes back to his department, will have had a training in the work of each of these departments?—No, I do not mean that.

67,747. That is exactly what I ask you to explain?—The training college will be for training the organisers and supervisors of these welfare societies.

67,743. As rural leaders for doing co-operative work in starting village welfare societies?—Yes, and they must have an elementary idea of all these departments.

67,749. As village guides and rural leaders?—Yes.

67,750. Supposing a man in the Forest Department is trained like this, then what is he to do?—I do not mean that the Forest Department officer is to be trained. I mean that the Forest Department should depute its officers to train the village workers and to give them some idea of the Forest Department.

67,751. He would help in this branch of co-operative work, in starting welfare societies?—The village co-operative workers will be trained in such a way that they will have an elementary idea of all the development departments and they will organise and supervise the societies. That is my scheme.

67,752. As a co-operator of long standing, I would like to ask you a few questions on one or two points. You suggest a federation. Have you, in this Province, something like a provincial institute at the apex?—Yes; there is the Federation here.

67,753. As other Provinces have?—I do not know what is the condition in other Provinces.

67,754. As a matter of fact, the major Provinces have. What should be the recognition given to such a provincial institute by the Government or by the Legislative Council, either by convention or by law? Do you think it should be a purely non-official co-operative body, or should it have a better status than that? Who is the president of the Federation here?—The Registrar.

67,755. The head of the Province is not the honorary patron or president?—No.

67,756. You are not given any subsidy or grant by the Legislative Council?—We are receiving some subsidy from Government.

67,757. You are on the recognised list?—Yes.

67,758. Speaking about the training for the co-operative staff in starting banks or supervising banks, it has been said that the weakness of the movement lies in the fact that there is expansion without trained staff. Do you agree with that?—Yes.

67,759. Do you visualise that if Central Banks are to be put upon a proper basis, or if they are to be expanded and multiplied, a time will come when the Registrar should be given the assistance of a technical financial adviser to look after these banking concerns, because, ordinarily, the technique of banking is not necessarily known by people who are posted to the office of Registrar?—Yes, that is so.

67,760. Would you like the idea of creating a post of Financial Adviser to the Registrar of Co-operative Societies?—There is no harm in it.

67,761. It is not a question of harm. It is a question whether it would do good; or would it be necessary?—It is necessary.

67,762. Are you influenced, in that opinion, by the fact that in the Punjab some such idea is being considered, or given effect to by the

creation of a post of Financial Adviser on about Rs. 1,500? Have you heard about it?—I know nothing about it.

67,763. Are you an advocate of land mortgage banks?—I am not in favour of land mortgage banks for financing the rural population.

67,764. In order to have a sustained continuity of policy in the Co-operative Department, would you advocate that the Local Government should establish a convention or issue executive orders that, whenever a departure in the policy is made, the various co-operative component organisations in the Province, such as your institute, should be consulted?—Yes, certainly.

67,765. In your experience as a co-operator, do you think that constant changes in the office of the Registrar conduce to a lowering of the activities of the department?—They do.

67,766. For how long should a Registrar hold office, in your opinion?—At least for ten years.

67,767. What are the advantages of keeping one officer for ten years?—He will gain more experience and work better.

Do you not think this will have some disadvantages too?—If the Registrar is a man with driving force, it will be an advantage. Supposing, on the other hand, a change of policy in the department has to be tried at the end of five years, there will be no room for such an experiment!

67,768. With regard to village welfare societies, I do not know whether you have heard of an experiment which has been tried in some other Provinces, namely, taluqa agricultural development associations?—No.

67,769. These village welfare societies would succeed only in tracts where there is the personality and the initiative of an honorary worker like you?—I think among the educated classes it will be possible to find organisers to organise societies of that type.

67,770. Even in backward tracts?—If proper propaganda is done and people are made to understand what co-operation means, I think it is possible.

67,771. How is it that such men have not come forward in other divisions of this Province?—The reason is that the activities of the Co-operative Department are wholly confined to loan-giving.

67,772. They have not realised and appreciated the other advantages?—No.

67,773. *Mr. Calvert*: From your very interesting note I gather that you are engaged on philanthropic work in your sub-division?—Yes; I am a humble servant of humanity.

67,774. You favour what you call a village welfare society?—Yes.

67,775. You make mention of the difference of opinion regarding the single purpose society and the multiple purpose society. May I know why you favour the multiple purpose society?—The main thing in making a society successful is to enlist the sympathy of all the village people, and therefore I am in favour of organising multiple societies. We can then induce the village people to join in. By getting the co-operation of all the village it would be possible to make the improvement of conditions in the village successful.

67,776. You will admit, I expect, that the residents in any one village may suffer from different economic ills?—Yes.

67,777. You do not favour having a separate society to meet each particular object? For instance, a gentleman of your education does

not want to join an adult education society or a credit society?—If you can induce the people they will gladly join.

67,778. What do you regard as the motto of co-operation?—Love and service.

67,779. You do not regard it as self-help and mutual help?—That comes afterwards; if you create a spirit of love and service, the other things must follow.

67,780. Do you accept the dictum laid down in the Act that co-operative societies must be for the promotion of the economic interest of their members?—Yes, I do.

67,781. And that no purely moral uplift society could be registered under the Co-operative Societies Act?—I do not know what exactly is in the Act, but I think that without moral improvement no economic improvement can be possible.

67,782. Would you agree to the converse also, that without economic improvement very little moral improvement is possible?—Both would go hand in hand.

67,783. Which do you think should go first?—It is very difficult to say, but I think that moral improvement is necessary.

67,784. Suppose you had again, as you had in 1866, a terrible famine in Orissa and these half-starved crowds all came into refuge camps, do you think that Government would be fulfilling its whole duty if it preached moral uplift to those refugees?—That is a special case; you would have to extend relief to them if such a contingency arose.

67,785. Do you think that Government might first feed them and then talk to them?—What I mean to say is that, if there is no moral improvement, then any economic improvement that there may be will not last.

67,786. You do not accept the general principle that insistence on moral uplift is the best way of destroying it?—No.

67,787. In your multiple purpose society your liability, I gather, must be unlimited?—Not necessarily unlimited, but we can organise societies on a limited liability basis also. There is no harm in doing that.

67,788. Does not your welfare society arrange for credit for its members?—Yes.

67,789. And therefore, under the Act, it must be unlimited liability?—Yes.

67,790. Do you think that unlimited liability is good for education or drainage or any other of these good ideas?—Yes

67,791. You ask for the right type of honorary workers, and you regard these as the educated public and the literate classes. Why will you not have the ordinary cultivator?—In my part of the country they are not sufficiently educated.

67,792. Do you not find that illiterate cultivators sometimes possess a most magnificent character?—Yes.

67,793. And a real power of leadership?—Yes, in some cases.

67,794. Were not most of the rulers of India in the past illiterate?—Not all.

67,795. Was not Ranjit Singh, the latest of all, illiterate?—Yes.

67,796 Literacy is not necessary for leadership?—No, but some amount of education and ideas are necessary.

Babu Tara Prasanna Ghose.

67,797. Which do you think would be the best worker in your area, the cultivator with a fine capacity for leadership, or one of the leisured classes?—Both can become good leaders.

67,798. But nowhere in your note do you refer to the actual cultivator as a leader or as an organiser?—I have no objection to finding one from the cultivator class.

67,799. Do you find that your society is reaching a stage when it will continue the very excellent work which it is doing without your help and guidance?—Yes.

67,800. If you were to become too busily engaged in other work, do you think that it would still continue?—If the proper spirit is awakened then it should continue.

67,801. *Dr. Hyder*: With regard to the point raised by Mr. Calvert, I was wondering whether a man of your culture would agree with what Aristotle said on this matter: "We must first earn a livelihood and then practise virtue."?—I do not know what Aristotle said, but in India they are more for moral uplift than for economic improvement

67,802. You think yourself that virtue would survive when the man had no livelihood?—I think if the moral standard of the people is high they will be the better able to earn their livelihood.

67,803. *Sir Thomas Middleton*: You are not in favour of land mortgage banks?—No.

67,804. You think that the ordinary co-operative credit societies should afford the loans that are required?—Yes, if they can arrange for granting long-term loans.

67,805. What should be the length of a long-term loan, in your opinion?—At least ten years.

67,806. Do you think that ten years is the maximum period for which a loan ought to be granted to the ordinary Indian cultivator?—In some cases it may be extended, but ten years should be the average limit.

67,807. Consider the case of a loan taken for digging a well or any improvement of that sort?—Within ten years they will be able to pay back the money.

67,808. You point out how necessary it is to keep the rate of interest down. I think you mentioned the rate as six-and-a-quarter per cent. Now take the case of this ten-year loan. That would mean sixteen-and-a-quarter per cent or more in each year. Would not that be a heavy burden to impose upon a man who has just dug a well? I want to find out what, in your opinion, is the longest loan that it is safe to grant under Indian conditions. When we grant loans for permanent improvements in England it is common to have loans for twenty or twenty-five years, but for various reasons the period in India would be less. You fix it at not more than ten years. Is that not a very short period?—I consider that ten years would be all right.

67,809. Would you have no form of credit which allowed loans in excess of ten years?—We have in some special cases given loans to the members up to fifteen years for redeeming heavily mortgaged lands.

67,810. Is there any practical objection to a loan for that period?—No.

67,811. If the borrower is a young man and his expectation of life is good, I do not see why he should be limited to a ten-year period?

67,812. What is the usual method of paying rent in your part of the country: in produce or in cash?—Cash; but in the uplands the tenants pay no rent, while they pay a very low rent in the lowlands.

67,813. How much do they pay?—About one rupee per acre on an average.

67,814. What is the price of paddy in your district?—It ranges from three to four rupees per *maund*.

67,815. So that a quarter of a *maund* of paddy would pay the rent?—Yes.

67,816. *The Chairman*: I want to be certain on one point. You want your village welfare society in every village, I take it?—Yes.

67,817. Assuming that you wish also to arrange for the provision, by co-operative means, of credit to the villagers, that you also wish to organise the sale of grain, and that you wish, let us say, to arrange a co-operative education society, is it really your suggestion that the village welfare society should embrace all these functions under one panchayat?—Yes.

67,818. Would you have your finances separated as between the various functions, or would you ask the villager who joined the village welfare society in order to take a part in the communal life and to improve the village to shoulder a share of the risk in the sale society? Would he take shares in the sale society?—Yes; he would take shares.

67,819. Would you have all your purposes entered in one set of books?—Different sets of books would be kept.

67,820. I will take you a little further. Would you ask your member who joins for the purpose of obtaining credit, but happens not to wish to sell his grain through the society, to share in the risk of trading which would obviously be attached to the sale society, or would you have entirely separate books and confine the liability to that of the credit society alone?—We would have separate books.

67,821. So that you will have a series of separate societies?—Not separate societies, but separate accounts will be kept.

67,822. Is your reason, for wishing that all instructions should be carried out under one *panch*, that you do not think there is enough talent in the village to provide separate panchayats for different purposes?—No; that is not my idea. My idea is to get the co-operation of the whole village for that.

67,823. I do not quite see why you want to bring all these purposes under one society. So far as I know, all experience in other countries is that multiple societies are something of a risk?—I do not know what the conditions are in other countries, but we find here that the working of multiple societies is very successful.

67,824. You have village welfare societies. Have you any village welfare society providing credit?—Yes.

67,825. Does it also work as a sale society?—No.

67,826. Does it work as an education society?—Yes; they are establishing schools by raising subscriptions.

67,827. So far as its business goes, it is a credit society which interests itself in village welfare work?—There are some societies which do not give any loan but are doing village improvement work.

67,828. If you ever come to the point where you wish to organise sale societies or societies to engage in manufacture or trade, you would have to start separate societies?—Sale societies are a complicated matter. The time has not come to organise sale societies in my area.

Babu Tara Prasanna Ghose.

A few societies were organised by the Co-operative Department, but all of them collapsed.

67,829. *Mr. Danby*: Are you a member of the district board?—No.

67,830. Did you stand for election?—No; I do not care to.

67,831. Do you find that the state of the roads in your district is deteriorating in recent years?—No; I do not think they are deteriorating.

67,832. Could you tell us what assistance you have had from the Agricultural Department?—They do their propaganda through us; they give us their improved seeds for distribution to members; they distribute their manures through us; they send their staff to supervise the work of the members.

67,833. Have you had any new seeds?—Yes; we have introduced the cultivation of sugarcane Co. 213, groundnut, Darjeeling potato and *dahia* paddy.

(*The witness withdrew.*)

Babu BIRBAR NARAYAN CHANDRA DHIR NARENDRA, Garhmadhupur, District Cuttack.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*c*) The question of treating cattle has so far received scant attention. India being mainly an agricultural country, the protection of her cattle from diseases and death is a prime necessity. Such small endeavours in this direction as have hitherto been made have been confined to recommending or administering a few medicines of the western school which the ordinary agricultural folk of India cannot afford to buy. Research work should be directed to examining the indigenous and inexpensive methods of treating cattle, and these should be supplemented by western methods.

QUESTION 2.—AGRICULTURAL EDUCATION.—(viii) Nature study, school plots and school farms, as at present organised, are all useless items in our educational system. Students are called upon to cram up a few theories under pressure of the schoolmaster's cane. They take no interest in them; they do not understand their meaning.

The best way to achieve the end would be to take temporary leases of land for each school, the students themselves raising crops in the indigenous mode with the help of their books as far as applicable. I speak of applying the principles of books reservedly, because these sometimes recommend implements and materials which involve costs quite disproportionate to the profits made.

The means I suggest is expected to avert the disinclination to go to the fields which is fast gaining ground in our community.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*), (*b*) and (*c*). In replying to other questions I have deprecated the use of the implements and materials of the West. I will revise my views if I am shown a greater net profit from my fields than what I get at present, taking into consideration all the costs of purchasing, importing, repairing and manipulating the implements and materials.

The best way to influence and improve the practice of cultivators and incline them to adopt expert advice is to show them to their satisfaction that they can profit more by changing their methods.

For this reason demonstration farms and propaganda are necessary in important village areas. The work of propaganda should be conducted on the lines of explaining to the people that the suggestions of agricultural officers are worth adopting from the standpoint of gain. People will gladly and readily change their methods and adopt expert advice, if they are shown that by doing so they will get bigger profits.

QUESTION 4.—ADMINISTRATION.—(*c*) (i) I am not satisfied with the Agricultural and Veterinary services from the agricultural standpoint.

The Agricultural Department should first examine and ascertain whether the use of foreign implements and materials, keeping in view the cost, will leave a higher margin of net profit to the cultivator than he gets at present.

If this be possible, the department should popularise their use by means of demonstration and propaganda. Measures, such as giving pecuniary assistance in the shape of *taccavi* loans, etcetera, should also be taken to enable cultivators to purchase those implements. Also, co-operative societies should be instructed to help the ryots in this direction.

If, on the other hand, this be not possible, people should be taught by means of propaganda and demonstration how they can multiply their yield by inexpensive changes in their wonted modes of cultivation.

As to the parts subject to flood and drought, such as Orissa, the department should devote its best attention to devising plans for protecting lands from sand and inundation, as also to finding new crops able to withstand flood and drought.

The indigenous method of treating cattle diseases should be co-ordinated with the western, so as to afford remedies within the easy reach of cultivators.

Sufficient pasture land should be provided in each village area to save cattle from starvation till people learn to grow fodder and stock it in silos.

For breeding purposes healthy bulls should be provided in the *mofussil*. The municipalities and district boards may be asked to maintain bulls of good breed to be lent on hire. The healthy ones amongst those roving in the mofussil as nobody's property should be marked and preserved from injury. Export of cattle should be discouraged by law.

These are but a few of the directions in which the Agricultural as well as the Veterinary Department should make efforts in the interests of the people.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i), (ii) and (iii). The Indian debtor's main source of credit is his land. He has practically no other source of credit nor any other means of repaying his loan. The yielding capacity of his land deteriorates daily, his family continually increases in number, the necessities of life daily grow more and more costly. He is therefore forced to borrow, and is unable to repay in the absence of supplementary means of income.

(*b*) and (*c*). I am not in favour of a close-fisted treatment of the cultivators' creditors, for this would render the cultivator helpless until he is made self-supporting by other means.

The best course to effect the cultivators' material uplift is to control imports and exports. The cultivator should be indirectly forced to dispense with those foreign commodities which he can produce at home. Control of imports will, while pressing him to become self-supporting, result in checking the need for exports. For instance, if foreign cloth

is sold at high prices in the market, the ryot will prefer to get it made at home. In consequence the money required to pay for the foreign cloth will be saved, and it will not be necessary for him to sell to foreign countries a portion of his staple food crops or other raw material to provide this money. The result will be that foodstuffs will be abundantly available in the country at moderate prices.

The land tax and other indirect taxes, such as that upon salt, are very heavy upon the Indian agriculturist. Their rigour ought to be lessened by curtailing the costs of administration.

Until these measures are brought into being, I have no hope for the Indian agriculturist.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) and (*b*) I am alive to the loss in agricultural efficiency due to fragmentation of holdings. A limit should be put to such fragmentation by necessary amendments in the Tenancy Acts; but legislation in this direction should not be such as to create hardship.

(*c*) Admittedly, litigation is a drain upon our slender resources, but litigation in India mainly relates to money debts, which are due to want. A materially well-off population will hardly like to flock to the law courts for the sake of pleasure. In my opinion, therefore, no prohibition in this direction is necessary.

QUESTION 8.—IRRIGATION.—(*a*) (i), (ii) and (iii) In a deltaic country like Orissa rainfall is very irregular; her lands are often subjected to drought. But, having a level coast land and having to carry to the sea the whole volume of rain water from the hilly regions of Central India, she cannot tolerate an extensive irrigation scheme in the form of canals. The existing canals pinch her by blocking up numerous natural outlets. Tanks, ponds and wells are the only feasible means of saving her from drought.

QUESTION 9.—SOILS.—(*b*) (ii) and (*c*) I know of extensive areas in Cuttack district, Orissa, that have been thrown out of cultivation by sand deposit due to blockade of natural outlets; these areas are gradually widening. I cannot suggest measures for reclaiming these lands, but the means of preventing further deterioration lies in clearing out the blockades and leaving nature to do her will.

QUESTION 10.—FERTILISERS.—(*f*) People would naturally like to use wood as fuel if they could afford it, but there are parts that have been completely denuded of wood. There are also parts in which the rigidity of the forest laws keeps people wholly deprived of the benefit of the jungle. What else can the people do but use cowdung cakes for cooking? Trees should be planted through the agency of local magnates and forest laws should be relaxed in order to enable cowdung to be saved. The fertility of the soil is diminishing more rapidly in areas where there are no trees; the reason seems to be that these areas are entirely deprived of the advantages of leaf-manure; so that plantation of trees has become a necessity from the standpoint of fertilisation.

QUESTION 11.—CROPS.—(*a*) It is for the research workers to point out more profitable new crops for our country. Generally I may say that some new crops able to withstand flood water ought to be devised for the flooded tracts. The Indian agriculturist now will laugh at the idea of growing fodder crops for his cattle; but the growing of fodder has become a necessity with the extension of cultivation over practically all the available land.

Fodder seeds and other suggested seeds should be distributed to agriculturists either free or on payment. The agriculturist should be taught the advantages of growing fodder.

We are under the adverse influence of the Arms Act. Sometimes the depredations of wild elephants and other wild beasts negative the strenuous efforts of the cultivator and he has no help. A larger number of licenses for fire arms should be granted, at least to villages situated in the neighbourhood of forests.

QUESTION 14.—IMPLEMENTS.—(*a*), (*b*) and (*c*). I should welcome any improvement in the agricultural implements and machinery, but I do not favour introducing foreign things, because they will be costly and are not expected to pay the expense of purchase. I would gladly have them if they were shown to be profitable.

Agriculturists meet with immense difficulty in procuring even the poor agricultural implements and machinery now in vogue. The reason, in my opinion, is twofold: firstly, material is not available except at high prices and tremendous trouble; secondly, village smiths and carpenters have been driven by penury to distant towns. Time was when jungle tribes sold unhewn materials for implements freely in village markets for a small price in cash or kind, and the village carpenter and smith shaped the implements at a standard rate of annual payment. These healthy organisations are no more. The sole remedy lies in curing the under-current of poverty.

QUESTION 15.—VETERINARY.—(*d*) and (*g*) I fully advocate legislation dealing with notification, segregation, etcetera; nothing but legislation will be fruitful.

Research into animal diseases is necessary, particularly for the purpose of finding out the good in the indigenous system.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i) and (ii) Healthy bulls of good breeds should be provided in the mofussil and district boards and municipalities should be asked to maintain them for hire. Existing healthy bulls should be marked and preserved. Good milch cows should be introduced. Large dairy farms should be opened in the neighbourhood of towns to supply milk, as well as good bulls and cows for sale. People should be taught to fight diseases easily and effectively. Laws should be promulgated for preventing diseases from spreading.

(*b*) (i) to (v) I have said, in connection with replies to other questions, that the present condition of our livestock is due to absence of sufficient pasture. The small area that is available is overstocked and is not everywhere even accessible for want of common paths. Of course in settlement papers we find mention of pasture lands, but such records are practically useless. To add to our difficulty, we have no knowledge as to setting apart land for growing fodder and stocking it against emergency. We are not very conversant with the methods of preserving straw and other cattle foods. The result is that our difficulties are exceedingly great when our land becomes parched with the heat of summer or remains deluged with rain water.

(*c*) In the Province of Orissa, of which my home district Cuttack forms part, fodder shortage is most keenly felt between the months of March and June, that is to say the zenith of summer, and also between the months of August and October when the grazing grounds in low-lying land remain saturated with water. After the rains set in in July new grass takes a fortnight or so to grow. Cattle in the low-lying areas have a good time for some days only in July, though those of the hilly countries continue to enjoy good conditions till the next summer. But in the latter case, summer sets in earlier and the high land loses moisture quickly. Thus, in the absence of any practice of fodder storage, the cattle of the country are starved for six months in the year.

Babu Birbar Narayan Chandra Dhir Narendra.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) The Indian cultivator works in his fields for six months in the year; the rest of the time he spends in idleness at home. At present some resort to distant towns in search of supplementary earnings during this idle period.

(*b*) India is a large country and is agricultural and non-manufacturing. She has no capital and no organisation to enable her to become a selling country. Foreign sellers have been given free access to her markets and no effort is made in the directions of home production. Hence she has been reduced to the position of a buying country, and thousands of her population have been thrown out of employment. Cottage industry is the most suitable way to relieve her masses from unemployment and want. It should be first directed to the production of the cultivator's necessities of life, such as cloth, matches, etcetera, which he buys. The State should take the initiative in organising and developing these industries. Simultaneously, protective measures should be adopted at the ports to promote the growth of these industries, in order that they may open the highway for the indigenous industries.

(*c*) I see no obstacle in the way of introducing the subsidiary industries suggested, provided the people are effectively taught to adopt them.

(*e*) Rural areas are the best fields for cottage industries, and should be made the centres of such industries.

QUESTION 18.—AGRICULTURAL LABOUR.—(*b*) Agricultural labour is growing dearer from day to day as it is not available in abundance. The reason is that the bulk of the agricultural population, not finding their home means sufficient, flock to distant towns in search of employment. The causes of want are (1) deterioration in the fertility of the soil, (2) increase of family, and (3) diversity of wants, unaccompanied by productive industry. The preservation of agricultural labour is dependent upon the removal of these causes.

QUESTION 19.—FORESTS.—(*a*) and (*b*) I do not think that forest lands are satisfactorily used for agricultural purposes. In their anxiety to derive income from forests, the authorities are in some localities prohibiting the raising of *til*, *rahar*, etcetera, on forest lands as before. Grazing facilities are not at all provided in the forests. The rigidity of the forest laws is carried to an extreme, sometimes unlawfully by the subordinate staff. In Khurdha sub-division of the Puri district there are villages situated in the midst of forests, but these villages are so very handicapped by the forest laws that the people have been forced to give up their cattle and swallow foods half cooked with the help of dry leaves as fuel. These laws should be relaxed. Trees should be planted in the *mofussil*. Sufficient specified areas with means of access and exit should be set apart in each village for grazing purposes. People should be taught to grow fodder and stock it. Seed of fodder crops should be distributed in villages. We are too much occupied with the affairs of the towns, whereas the village should form the unit of all our attempts for the material uplift of our people.

QUESTION 23.—GENERAL EDUCATION.—(*b*) (ii) I have said before that India is a very large country. No amount of expense and labour can make her people, generally, highly educated; it is not possible in the nature of things. But there ought to be a general leavening of literacy. People should be given the facility to understand things; hence compulsory primary education in the country is very necessary. India was happier in pre-British days when she claimed a greater percentage of literacy than at present.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) Unless people are enabled to understand things by the spread of literacy, they will never

listen to any sermons on the rules of hygiene. The removal of want and the spread of literacy are the only means of making them healthy. I am afraid we start at the wrong end when we attempt to improve health without first providing nourishment.

Oral Evidence.

67,834. *The Chairman*: Babu Birbar Narayan Chandra Dhir Narendra, do you wish to add anything to your note at this stage?—No. I have fever, and therefore I will not be able to answer many questions, but I shall answer as many as I can if you will bear with me patiently.

67,835. Are you an agriculturist?—I have got some land of my own.

67,836. Do you farm yourself?—I have a home farm, but I, myself, do not cultivate.

67,837. You have a home farm; do you take some interest in it?—Yes; I do take some interest in it.

67,838. Do you agree that zamindars, as a class, do not take that lead in agricultural matters which they ought to take?—There are a few zamindars who take some interest in agricultural matters; but all zamindars do not take that interest.

67,839. Do you think it would be a good thing if a larger proportion took an active interest?—Of course I do.

67,840. Have you any means to suggest by which they might be encouraged to take greater interest?—It depends upon the nature of the man whether he takes an interest or not. I do not see how all can be induced to take interest in agriculture. There are some zamindars who do take interest even now.

67,841. Would you turn to your answer to Question 14? Why have the village smiths and carpenters been driven by penury to distant towns? How did it come about?—As they have not sufficient food in their village, they go to Calcutta and Jamshedpur where they get more wages.

67,842. Have conditions deteriorated in the villages?—There is uncertainty of crops. Sometimes in Orissa we get high floods which spoil our crops. There are a few areas which are irrigated, but they also have deteriorated.

67,843. Floods in Orissa are nothing new; they have existed from time immemorial, have they not?—Floods used to occur within intervals of fifteen or twenty years, but now they are occurring every year.

67,844. I do not quite see why it should press more heavily on smiths and carpenters. Are there no smiths or carpenters in your village?—There are smiths and carpenters in some villages, but not in all villages.

67,845. I understand that you think that one way of improving the lot of the cultivator in India would be forcibly to deprive him of the use of what you call "those foreign commodities which he can produce at home." Do you mean to include cloth made in factories in India or not?—Of course. Formerly they were growing cotton; now they do not. They purchase many things now, and in order to find money for that they sell their paddy, which is the only crop which they can sell for money. They are extravagant sometimes and as a consequence they sell away all their paddy and do not keep enough for themselves.

You are going to deny the cultivator the advantage of cheap goods manufactured in factories (never mind whether they are made in factories in Bombay or factories in Birmingham; the economic result is the same)!

Babu Birbar Narayan Chandra Dhir Narendra.

67,846. Are you anxious to see a rise in the standard of living amongst the cultivators?—Yes.

67,847. Would not a rise in the standard of living inevitably involve the purchase of commodities made by other people?—Yes. There is no harm in their using those commodities if they can get more produce from their lands than they are getting now.

67,848. Do you think that the result will be a rise in the standard of living, if you insist that he should make everything that he uses with his own hands?—He should do as much as possible.

67,849. Would you mind telling me whether you made the spectacles that you are wearing to-day?—No.

67,850. Could you make spectacles?—I cannot.

67,851. Could you make any of the clothes that you are wearing to-day?—How can I?

67,852. Could you make your boots?—No.

67,853. Did you make the razor with which you shaved this morning?—No.

67,854. Did you make the telephone that you use?—No.

67,855. Do you ever go in a motor car?—Yes.

67,856. Could you make one?—No. If we are taught we can.

67,857. Do you like a fan in the hot weather?—Yes.

67,858. Can you make a fan?—No; how can I, unless I am taught?

67,859. Do you like ice in your drink in the hot weather?—Yes.

67,860. Can you make ice?—No.

Then you are going to have a pretty bad time if you attempt to raise your own standard of living by the methods you propose to apply in the case of the cultivator.

67,861. *Mr. Kamat*: Do you think that the land tax in this Province is very heavy?—It is not heavier than in Bihar; it is three to four rupees per *bigha* but the constant failure of crops makes it heavy.

67,862. On page 409 of your note you say: "The land tax and other indirect taxes, such as that upon salt, are very heavy upon the Indian agriculturist"?—Yes. At present they can get about Rs. 74 per *bigha*, and they have to spend about Rs. 39-6-0 to get that return.

67,863. The gross income per *bigha* is Rs. 74?—Yes, but that is only in the case of good lands.

67,864. And the cost of production is Rs. 39-6-0?—Yes.

67,865. And the net profit is about Rs. 35?—Yes.

67,866. Out of which Rs. 3 is paid as land tax?—Yes.

67,867. If, out of a net profit of Rs. 35, you have to pay Rs. 3 as land tax, do you consider that a very heavy land tax?—But all these rents have to be calculated, and there are other indirect taxes like the salt tax, etcetera. Of course, if they do it properly, then it will pay them.

67,868. I am not concerned with other taxes; I am only concerned with the assessment, and I ask you whether the land tax is heavy?—I do not think it is heavy. Sometimes, where the lands are deteriorating on account of deposit of sand, it is rather heavy.

67,869. I am not asking about deterioration; I am asking a general question about the land tax. You say that it is not heavy?—It is not heavy.

67,870. *Sir Thomas Middleton*: You point out how badly off the cattle are in this country, and you say "We are not very conversant with the methods of preserving straw and other cattle foods". Surely, the cultivator knows how to keep straw? Do not all the cultivators in your district store their straw?—Very few.

67,871. What do they do with it?—They sell it; very few store it.

67,872. And the cattle starve for six months?—Yes. The shortage is felt between the months of March and June; also when there is water on the lands the cattle cannot go to the grazing grounds, and there is therefore no fodder for them.

67,873. You do not believe much in the school education that is now given. You say "Students are called upon to cram up a few theories under pressure of the schoolmaster's cane." Is the schoolmaster's cane very common in India?—The fact is that when they leave school the students do not go back to the fields; of course, I am speaking of my village only. I think if they are taught to do practical work they will go back to the fields.

67,874. *Dr. Hyder*: Did you go to any college?—I have attended school.

67,875. Are you a B.A.?—I am a matriculate.

67,876. Have you a son?—Yes.

67,877. Does he go to college?—He attends school.

67,878. He has not yet come up to the university stage?—No.

67,879. Have you read any books on economics?—Yes.

67,880. You have very peculiar views. I want to know how you have come to form them?—How are they peculiar? I have full knowledge of my village, and I have stated what I have seen with my own eyes.

67,881. *Babu A. P. Varma*: Have you made any experiments with western implements on your fields?—Yes, but our bullocks are not sufficiently strong to pull these iron ploughs.

67,882. You failed in the experiment?—It was a failure. When the plough was broken, we could not repair it at the village, and we had to send it to Cuttack and other places, and that cost a good deal.

67,883. When you were making the experiment, the plough broke down, you could not repair it, and therefore you could not repeat the experiment?—I could not continue the experiment; besides, the bullocks are not strong enough to pull these iron ploughs.

67,884. You are not sure whether that experiment could succeed?—I am not sure. If the plough is made a success, then so much the better.

67,885. How can you say that it will not work properly?—If the Agricultural Department tries it, shows to the people how to cultivate with it, if it is suitable for the cultivators' bullocks, and if the cultivator can purchase good bullocks, then it would be all right.

67,886. On page 499 of your note you say "A materially well-off population will hardly like to flock to the law courts for the sake of pleasure". What do you mean by that?—These poor people often lose their crop, and whenever they lose it they cannot get food. So, they mortgage their lands to the *mahajans* and get money from them to buy food, and the *mahajans* go to court.

Babu Birbar Narayan Chandra Dhir Narendra.

67,887. Do you mean to say litigation is a matter of pleasure?—Sometimes it is a matter of pleasure, and sometimes a matter of necessity.

67,888. Do you mean that if the country is happy, there will be no litigation?—That is my idea; if people are more happy, there will be less litigation.

67,889. *Mr. Kamat*: You said that the land tax was Rs. 3 out of Rs. 35, and that it was not very heavy. Would the people be willing to pay a little more?—No, I do not think they would be willing to pay more. Of course, if they are forced then they will pay.

67,890. If you say that the assessment should be the same as during the time of Lord Cornwallis, will you tell me whether you had good roads during Lord Cornwallis's time?—No.

67,891. Did you have any hospitals or dispensaries at that time?—No.

67,892. Or any colleges or primary schools?—No. Of course, all these things are good; I do not say they are bad, but what is that to a cultivator?

67,893. If these things are to be provided, where is the money to come from to provide them?—The thing is that our people, when they get education, do not go back to the land.

67,894. If you want all these comforts, and if the assessment is to be the same as during the time of Lord Cornwallis, whence is the money to come from for providing these comforts?—The tax is to be raised.

(The witness withdrew.)

Mr. J. M. Cowan, M.A., B.Sc., Offg. Director, Botanical Survey of India, was next examined, for whose evidence see Volume I, Part III. Thereafter the Commission adjourned till 10 a.m., on Friday, the 25th November, 1927.

Friday, November 25th, 1927.

PATNA.

PRESENT:

The MARQUESS OF LINLITHGOW, D. L. (*Chairman*).

Sir HENRY STAVELEY LAWRENCE, K.C.S.I., I.C.S.
Sir THOMAS MIDDLETON, K.B.E., C.B.
Sir JAMES MACKENNA, KT., C.I.E., I.C.S.
Mr. H. CALVERT, C.I.E., I.C.S.
Raja Sri KRISHNA CHANDRA GAJAPATI NARAYANA DEO of Parlakimedi.
Professor N. GANGULEE.
Dr. L. K. HYDER.
Mr. B. S. KAMAT.

Mr. E. DANBY. } (*Co-opted Members*).
Babu A. P. VARMA. }
Mr. J. A. MADAN, I.C.S. } (*Joint Secretaries*).
Mr. F. W. H. SMITH. }

Mr. J. H. LYALL, B.A., Officiating Conservator of Forests Bihar and Orissa.

[*Mr. Lyall was examined on the following replies to the questionnaire submitted by Mr. A. J. Gibson, I.F.S., F.C.H., F.L.S., F.Z.S., Conservator of Forests, Bihar and Orissa.*]

Replies to the Questionnaire.

QUESTION 19.—FORESTS.—(*a*) I do. In fact, with intensive systems of forestry, the area of reserved forests open to grazing may show some diminution.

(*b*) Village forests should be managed on a simple system of regular working, the working schemes to be in the charge of village panchayats whenever possible. Such working scheme would provide for systematic rotational closures to grazing and felling, thus ensuring continuity of supply.

(*c*) Undoubtedly. This is very marked in parts of the Punjab, United Provinces and in Bihar and Orissa. In the last Province the areas most liable to erosion are situated on the Chota Nagpur plateau and in the Sambalpur district. The remedies for this state of affairs are standard; they consist of closures to grazing, the encouragement of growth of grass, shrubs and trees and, where the erosion is serious, remedial measures such as terracing the area, putting in retaining walls and so forth.

By conservation of the forest growth in the catchment areas of the larger streams and rivers, damage from floods can be very considerably reduced.

(*d*) The reply to (*c*) applies to (*d*). Areas covered with forests, though they may not increase rainfall, certainly tend to reduce the speed of the "run off" of the rain that does fall, cause gradual percolation into the soil and retain moisture for feeding local streams and rivers for a longer period of time.

The answer to the last part of (*d*) is in the affirmative.

(*e*) There is, more especially in the more thickly populated districts in Bihar proper and in the Puri district of Orissa. Work on such schemes is, however, costly and success depends mainly on the provision of adequate funds.

(*f*) Village and private forests in Bihar and Orissa are undoubtedly suffering deterioration from excessive grazing and unregulated fellings. This state of affairs leads directly to soil erosion. Remedies are stated under (*c*).

The utilisation of forests for the benefit of agriculture in Bihar and Orissa.—The first charge on the products of the State forests of India has always been the requirements of the agriculturists. This principle has been recognized ever since a State forest policy was evolved for India between the years 1855 and 1864. But it was not till 1894 that the Government of India issued a detailed statement of their forest policy (Resolution No. 22-F., dated the 19th October 1894). The aim was, more liberal recognition of the claims of the villagers to forest produce for the supply of their personal wants, the sustenance of their cattle, and the needs of cultivation. The principles laid down in the resolution can be summarised as follows:—

The regulation of rights and the restriction of privileges of user enjoyed by the inhabitants of the immediate neighbourhood are justifiable only when the advantage to be gained by the public is great.

In the application of this principle, forest lands were to be broadly classed as:—

(*a*) Forests, the preservation of which is essential on climatic or physical grounds.

(*b*) Forests which afford a supply of valuable timbers for commercial purposes.

(*c*) Minor forests.

(*d*) Pasture lands.

Forests of class (*a*) were generally those essential to the preservation of hill slopes and the regulation of destructive torrents, and so long as there was reasonable hope of the restriction being effective they were to be strictly protected. The second class of forests were to be managed mainly on commercial lines, as valuable State properties and sources of revenue. Even here forest income should be subordinate to the reasonable requirements of the local inhabitants. In the third class of forests (*c*), useful chiefly for the supply of fuel, fodder or grazing, local interests were to come first.

The claims for cultivation were to be recognised as stronger than the claims of forest preservation. Forest lands might be diverted to agricultural purposes provided the cultivation was permanent, did not honeycomb the forests with fields and settlements, or encroach on the minimum forest for general needs; and provided also that the forest was not essential to the preservation of the tract.

This resolution is still the basis of forest policy in India. Its principles were applied in some instances in an exaggerated form, but there is no evidence of any general check to progress in forestry or to the growth of forest revenue. The reservation of forests is now completed over most of India with the exception of Burma and Assam. There is a definite minimum forest area required in every Province to meet general needs. In Bihar and Orissa, the actual area of forest is dangerously low.

2. Of the total area of British India, thirty-nine per cent is agricultural land, twenty-three per cent is State forest and thirty-eight per cent is other land. The actual area under forests varies from Province to Province, the maximum being fifty per cent in Burma and the minimum three-and-a-third per cent in Bihar and Orissa. The other land includes an important tract of nominally forest land which is the vast area of grazing grounds held by villagers as common lands attached to their agricultural holdings. As forest this area is of little value, but the tract furnishes valuable grazing and fodder supplies, as also, to a smaller extent, small building timber and firewood for the villagers' use. There is an increasing volume of opinion in the Forest Department that such tracts should receive much closer attention than they have in the past and that such lands should be made to yield to the people a much better return than they do now. Disregard of this view will end in the total disappearance of forest on village forest land and the villagers' demand in consequence will bear more and more heavily on the forests under the Indian Forest Department.

3. In many parts of India, and Bihar and Orissa is no exception, a great deal of the time of the Forest Officer is occupied in what may be termed "estate agency work" or "factor's work", to use the Scots expression. The provision of grazing grounds for the agriculturists and the nomadic graziers, the control of such grazing, the provision of timber for agricultural implements and buildings, firewood for domestic purposes and so on, are very important items in the daily routine of the Forest Officer, from the Divisional Forest Officer down to the forest guard. In 1923-24, the State forests of British India supplied grazing free or at nominal charges for over thirteen-and-a-quarter million head of cattle. The figure has remained fairly steady for the last five years, but the introduction of regular systems of regeneration of the forests may reduce it in the near future. This question of grazing is the most important factor that has to be considered in the relation between the Forest Department and the agriculturist. Unrestricted grazing and intensive forestry are incompatible. In 1924-25, the number of kine, alone, in India was one hundred and forty six millions. The Forest Officer has to view this large number of cattle, many of them useless, as a distinct menace to the future of the State forests while the handicap to advanced agriculture is obvious. The various cattle protection societies in Calcutta and elsewhere advocate extension of grazing grounds but the fact has to be emphasised that the granting of facilities in the shape of additional grazing grounds for such cattle is not going to solve the problem but is going to aggravate it. Efforts should be concentrated on improving the breeds of cattle so that a pair of Indian plough-bullocks can approximately do the amount of work done in countries like Italy and France. Stall-feeding, the growing of fodder crops and the reservation of considerable areas of village waste lands for the purpose of growing grass for hay have all to be considered. The throwing open of additional areas of State forests for grazing purposes will defeat the object in

view. Apart from deterioration of the cattle, the loss in manure is enormous. All the Forest Department can do is to set aside certain areas of Government forests as fodder reserves and help the villagers to get a better yield of fodder, etc., from their own lands.

4. Connected with the above is the practice of the villagers to burn the State forests either annually or at intervals of two or three years. The object in Northern India is to increase the grass supply. The object in Bihar and Orissa, where the forests are generally at a higher level than the paddy fields, is mainly to reduce the layer of leaves and brushwood to ashes which are carried down by the monsoon rains to the fields, thus increasing their fertility. The Forest Department in Northern India has recognised the economic necessity of firing the forests and, instead of allowing the villagers to burn the forests illicitly, have started a regular system of burning forests annually, under control. Regulated firing results generally in a gentle ground fire, doing little or no harm to the tree crop. Unregulated firing may mean, and often does mean, the extermination of tree growth. A great deal of regulated firing can be done in Bihar and Orissa to meet the local needs. The forests concerned are generally too remote to be utilised as grazing grounds.

5. Apart from the above considerations, the Forest Department in Bihar and Orissa cannot propose any further utilisation of the forests in Bihar and Orissa for the benefit of agriculture. Restriction and regulation of rights and privileges will be necessary for many decades in the interests of future generations of agriculturists. In some Provinces, mainly in the Madras Presidency, considerable tracts of forest land have been handed over to the people to be managed under the so-called "Forest Panchayat" system. The experiment will be watched with interest but it still remains to be seen whether the average villager is able to consider corporate requirements and the interests of future generations before his personal, immediate and generally extravagant wants.

Oral Evidence.

67,895. *The Chairman*: Mr. Lyall, you are Officiating Conservator of Forests in the Province of Bihar and Orissa; and I understand you are willing to be examined on the note provided for the Commission by the permanent Conservator, Mr. Gibson?—Yes.

67,896. Would you like to make any additions or alterations to Mr. Gibson's note; do you dissociate yourself from any of his views?—I do not think so. But I would like to say that the availability of the forests for agriculture depends very largely on the improvement of communications, because where there is an excess of forests generally there is a deficit in roads and also shortage of agriculture, and where agriculture is intense you get no forests.

67,897. When you say that the availability of the forests for agriculture depends on the improvement of communications, what exactly are you thinking of?—I mean all such things as agriculture generally requires, charcoal and fuel (as opposed to timber), and small building timber (that is, poles) which is used by agriculturists. We have communications, but they are unmetalled roads as a rule, and it is not an economic proposition to carry fuel or charcoal to long distances.

67,898. We have a statement of the extent of the forests in the Province. Is your classification of forests in the Province the one which we find elsewhere in India? Perhaps you might describe it shortly?—I think it is the same. The forests which provide valuable timber lie in

inaccessible areas and minor forests are usually of an inferior description and yield nothing but fuel and poles.

67,899. You have, I take it, forest areas in which grazing is altogether prohibited; would you allow firewood to be taken from those areas?—We would be very glad to get the firewood taken away.

67,900. Are there forest areas in the Province, where no grazing is allowed?—Yes, periodically.

67,901. In areas where grazing is allowed, is a fee charged for grazing?—No. A great deal of the grazing is not charged for at all. There is a large number of agriculturists who have grazing rights in certain areas.

67,902. Can you give us an indication of the charges where they exist?—I have with me some figures giving the value of the timber, fuel, grazing and minor produce which we give away annually.

67,903. I mean the rate charged per animal?—It is two to four annas per annum; buffaloes are of course rather more expensive, because they do not confine themselves to grass.

67,904. Is the practice of cutting grass from the forests in vogue?—That is allowed but not practised.

67,905. Have you forest areas where grass cutting is allowed which might be expected to provide valuable fodder?—I should not think we have such areas in this Province.

67,906. You mean that grass does not grow freely in the forests?—Grass does grow, but not to the same extent as in the Central Provinces; we have not as much grazing revenue as they have.

67,907. This is a Province which, from time to time, suffers from fodder famine, does it not?—There has been no fodder famine since I have been here.

67,908. You have never known a period of fodder shortage?—In many agricultural areas you do get acute shortage, but not in forest areas.

67,909. If you had better communications and roads, do you not think some system of baling forest grass might be a measure of insurance against the worst effects of a fodder famine?—I think it might be done. A large part of the grass which grows in the better class of forests and in some of the worst class of forests is used for paper making rather than for fodder.

67,910. By private enterprise?—Yes; and for grass-rope making.

67,911. *Sir Henry Lawrence*: Is there no grass-baling at all?—No, except for paper-making.

67,912. Is there no grass for baling?—Not very much. The reserved forests are only three per cent of the area; there is much private forest.

67,913. Do they cut grass out of private forest for baling?—I think it is mostly grazed.

67,914. *The Chairman*: Have you, in your experience in the Province, ever seen grass cut and hay made in the forests?—No, never.

67,915. In whose hands is the charcoal burning industry?—We started that departmentally in Sambalpur about four years ago, but owing to the failure of the market and the long railway lead and long road lead it had to be given up. There are large areas where charcoal could be made if communications were improved. By communications I mean metalled roads, not *kutcha* roads.

67,916. With better communications, could you hope for a demand at a price at which the commodity can be supplied; if there were better roads, could fuel be made into charcoal and exported from forest areas to distant centres for consumption?—I think so.

67,917. Charcoal would be small in bulk compared with its calorific value?—Yes.

67,918. You say that the forests form three to four per cent of the total area; is that the total area of forests? Does it include the private forests?—No; only those under Government control.

67,919. Can you give us the figure including the private forests?—I am afraid I cannot.

67,920. Can you give us any idea of the proportion that State-owned forests bear to private forests?—There are twenty-seven Feudatory States under the Government of Bihar and Orissa, and I think fifty per cent of their area is under forests; I know their annual surplus is about twenty-seven-and-a-half lakhs of rupees whereas the annual surplus of Government forests is two-and-a-half lakhs. That gives some idea.

67,921. Assuming that the area under private forests is approximately equal to the area under State-owned forests, is it your view that the proportion of forest land, having regard to the population and the cultivable area, is dangerously low?—I should say it was.

67,922. Is that a progressive evil? Are forests being gradually removed?—Private forests most certainly, particularly on the Chota Nagpur plateau.

67,923. Mr. Gibson takes the view that if the forests which, from the forest point of view, are useless, were given more skilful attention, far more might be made of them from the agriculturists' point of view. Do you agree with that statement?—I agree with that entirely; it is a question of fencing.

67,924. They should be enclosed?—That is my personal view.

67,925. Has the Government of Bihar and Orissa attempted the system of forest control by panchayats?—That system has not so far been attempted in this Province.

67,926. If you are going to attempt these methods of conservation in the teeth of local public opinion you would require an army of police to make them effective, would you not?—Yes; but a great deal of good would result from it. Then you could drop on all village headmen, and insist on communal responsibility.

67,927. Having regard to the large areas concerned, the population and their traditional rights in the forests, is it not almost certain that if any steps are to be effective, the villagers must be taken with you willingly?—If possible, yes. The villagers are allowed a large number of rights in some forests, but the amount of rights is very seldom specified in the notification in which those rights are allowed, and the difficulty is to prevent their selling, to a third party, timber which they are entitled to only for their own use.

67,928. Mr. Gibson describes a system according to which agriculturists choose ground on a higher level than their cultivated fields, and burn the brushwood and leaves there in order that the ashes may be carried down by the monsoon rains to their fields for manurial purposes. Apart from that, does the method of collecting leaves from

forest trees and using those leaves on the fields for manure obtain in the forests of this Province?—I have not seen it in the forest areas; I have seen it in agricultural areas.

67,929. You mean, from scrub jungle in agricultural areas?—No; generally from mango trees growing alongside the roads.

67,930. Is your department in more or less constant conflict with villagers as to the use, by the villagers, of forests in the neighbourhood of their land?—No.

67,931. Does it not depend also on the tact of the officer whom you are employing in the particular neighbourhood?—It depends on the amount of forest which is not reserved in the neighbourhood.

67,932. Does it not also depend a good deal upon the tact of your officers?—Yes.

67,933. Are there areas in this Province where erosion and denudation of agricultural land is proceeding as a result of the removal of forest growth?—Yes, I should say that there are such areas in the Palamau district and on the Chota Nagpur plateau, where the Orissa floods partly originate.

67,934. You have the two sources of danger to agricultural interests: In the first place, you have the erosion of agricultural land itself, and in the second place you have the risk, as a result of the erosion of lands higher up the streams, of losses in agricultural value due to sand and rubble being deposited on the fertile lands?—Yes.

67,935. Do both these conditions exist?—I cannot speak for Orissa, but that is the case in the area to which the greater part of Chota Nagpur belongs.

67,936. Is the department taking any active steps to plant up the ravines and so stop erosion?—I am afraid the department cannot do very much at present, because these forests are largely private owned.

67,937. Do you not think that, on broad grounds of public interest, the Provincial Government might well invest itself with the power to take appropriate steps, interfering as little as may be with private interests, to prevent erosion where that is serious?—I think it can.

67,938. *Professor Gangulee*: Is soil erosion very serious in the Hazaribagh district?—I should say it was.

67,939. Owing to the Damodar floods?—It is due to the erosion. The forests are fired there annually; they have been reserved only in the last four years.

67,940. *The Chairman*: It has been suggested to this Commission by more than one witness in this Province that the indiscriminate use and progressive destruction of forests in Chota Nagpur is due, in some measure, to the fact that the respective rights of the zamindars and ryots have not been plainly defined and are not sufficiently well understood by the public. Can you speak to that point?—I should say that that was very true. The conflict between the ryots and zamindars results in the destruction of the forests. The ryots have, by custom I think, been allowed by the Settlement Department to use the forests for their own purposes.

67,941. The point of these witnesses is that that conflict might be removed or, at any rate, mitigated, if an exact statement of their respective rights were to be made available?—It would, but it would involve heavy clerical work. It has been done in other Provinces, and it can be done here.

67,942. It would involve very much clerical work?—Yes, you have got to fix the amount of building timber, plough timber, and fuel for each family annually, and maintain registers for each village.

67,943. It is not a question of enunciating a principle? It is a matter of deciding on the spot?—You will have to take a fair average for each household.

67,944. Do you think any hope is to be looked for, in this matter of the general shortage of forests in proportion to the cultivated area, from any attempt by Government or other agency to plant areas near villages with forest trees?—If the villagers are to benefit by this planting, they must do something to contribute towards it in the way of providing labour and excluding grazing. Without those two things, you cannot introduce forests in areas where they do not exist.

67,945. Do you think, having regard to the many different functions expected of the two groups, that it might be well to have a special service, perhaps subordinate to the Conservator of Forests, to deal with the forest and scrub tracts in the agricultural areas; separate, that is, from that which deals with the large and valuable timber problems in the reserved forests?—I think it would be worth while, but its duties would be very largely of a police nature, namely, detection and prevention of forest offences in such areas, and the control of grazing.

67,946. But the administrative problems which would also exist would be very different from the administrative problems in reserved forest areas?—They would.

67,947. Do you know whether the practice of planting bamboo near villages is common?—I think it is quite common in certain areas.

67,948. They are at liberty to plant it?—Yes, they are at liberty to plant it, but they do not plant the forest species. There are two species of bamboo, one that grows in the forest and the other that you find in the villages; they are quite distinct.

67,949. *Sir Henry Lawrence*: Which is the more valuable?—The one which grows nearer to the villages, and they plant those themselves. They keep the clumps in excellent condition, and they keep them well thinned.

67,950. *The Chairman*: Has any attempt been made to encourage the planting of bamboo near villages in areas where the practice is not indigenous?—The department have started plantations on these lands within the last three years, but our efforts are confined to areas where we have staff; in areas where bamboo is very largely absent, we have no staff; we cannot do anything.

67,951. The bamboo seems to me to provide the villages, at a very small cost, with a most valuable material which is useful for a hundred jobs. In that way the bamboo is invaluable?—Yes.

67,952. Do you know any case of zamindars having planted areas with forest for fuel or timber?—I do not. But within the last year, certain zamindars in Chota Nagpur have raised the proposition that their forests should either be taken over by Government or managed by Government on their behalf, but they are always apt to want very accurate estimates of costs and to expect forests, previously much abused, to yield an immediate, handsome financial return, without further investment of capital in communications.

67,953. *Sir Henry Lawrence*: Is there any attempt by villagers to grow quick-growing fuel trees for their own use?—No, I have never

heard of any. I have heard of a few villagers in Chota Nagpur who tried to control the cutting of fuel trees in their village forests, because there was so much local scarcity of fuel, but they have never deliberately planted it themselves.

67,954. Does the casuarina grow in this Province?—It grows in Orissa.

67,955. Does it not grow up in these plains?—No.

67,956. In Southern India there is the practice of growing clumps of casuarina for village use. That is quite unknown here?—I think it is unknown.

67,957. Would it be possible to do such a thing here?—It might be done.

67,958. It is grown in forests?—It is grown near Puri.

67,959. Near the sea?—Yes, near the sea.

67,960. *Sir Thomas Middleton*: In reply to the Chairman, you informed us that grass cutting was allowed but not practised in the Province, and the general reason which you indicated was distance. That difficulty may account for ninety per cent of the cases, but there must be a number of large areas in the Province, not very distant from cultivation, where grass cutting would be possible but is not practised?—There are large areas.

67,961. What prevents the practice of grass cutting, when communications and distance are not the difficulties?—I should say it was the indolence of the people.

67,962. The grass is there, but they will not cut it?—Yes. I could give you a case in point. I was in charge of a small area of four hundred acres, and the incidence of grazing on that area was fifty buffaloes, five hundred cows and seven hundred sheep. We fenced a quarter of the area to plant trees for lac; we gave them permission to cut the grass that grew in that fenced area, but they would not do it, and the area was within half a mile of their village.

67,963. Could you tell me what was the condition of the cattle in the village? Did they have a sufficient supply of fodder, or were they short of fodder?—There was practically no pasture in the forest for them to graze on.

67,964. Did the villagers have rice straw?—They had rice straw.

67,965. And they relied on that for feeding their cattle during the hot weather?—Yes. Of course, they have a good many more cattle than they need.

67,966. The total area under forests in Bihar and Orissa is about seven-and-a-half million acres, according to the statistics?—Yes.

67,967. You told us you have got only 3·3 per cent of reserved forest, 250,000 acres or thereabouts?—Yes.

67,968. What do these reserved forests consist of in the main? Are they broad-leaf or coniferous forests?—They are broad-leaved forests.

67,969. You have no coniferous forests in the Province?—No, not under Government control.

67,970. With the exception of that small area of reserved forest growing valuable timber, the whole of the remainder of the area of seven million acres is minor forest and pasture land?—Yes.

67,971. Mr. Gibson explains that the duties of the forest officer in connection with minor forests and pasture lands are mainly those of an estate agent?—Yes.

67,972. In this Province what proportion of the forest officer's time is occupied in looking after these large areas of minor forests?—We put the best of the forest officers in charge of the important reserved forests. There are certain areas where there are no reserved areas and yet there is a forest department and we have to try and to keep a check on output. The work of the forest officer in an area like the Santal Parganas is almost entirely that of estate agent. But the duties are very largely confined to paper in a way. You have to issue permits and arrange for their check at different places.

67,973. There are so few officers as compared with the area to be managed that their duties are all office work?—Yes.

67,974. Local control is left to forest guards?—Yes, it has to be.

67,975. Do you distinguish between minor forests and pasture lands in this Province, or are they run together?—They are run together. There is no area that is definitely administered as pasture land.

67,976. You mentioned just now an interesting case in which you fenced an area. Is it a frequent occurrence in this Province to fence areas in these minor forests?—No; it is part of a scheme which Government have in hand to increase the supply of brood lac and they fence these areas for a special purpose.

67,977. Do you think it would be quite impracticable to control grazing in the way that a forest officer would desire to see it controlled, unless you had fenced areas?—Yes, where the grazing demand is high, in such areas the offence of illicit grazing is committed by night.

67,978. *Mr. Calvert*: Some rather strong evidence has been given to us by Mr. Foley. He says "The destruction of forests is going on all over the Province except where forests are reserved or protected." Do you agree with that?—Yes.

67,979. Further on he says: "I am convinced that no zamindars or ryots in the Province will ever take any measures to preserve forests unless compelled"? Do you agree with that?—Yes.

67,980. He further says: "Both zamindars and ryots look upon the destruction of forests as a matter of absolute indifference"?—Yes, until the forests cease to exist.

67,981. Then he says: "Expenditure was vetoed by the Council who are altogether opposed to forest conservation." Is the Council opposed to forest conservation?—Yes, there was an adverse vote in the Council. Those who came from the Orissa flood areas were not opposed to the vote but the parties could not compose their differences. I think the Council is opposed to conservation on the whole.

67,982. He says that soil erosion is common in many districts besides Hazaribagh. Do you agree?—Yes.

67,983. Finally he says "I think it is to be acknowledged that with the growth of population and industries the whole of the forests in Bihar and Orissa with the exception of those managed by the Forest Department will disappear". Do you agree?—Yes, unless measures are taken to stop that.

67,984. *Babu A. P. Varma*: On the first page it is said that with intensive systems of forestry the area of reserved forests open to grazing may show some diminution. I want to know the force of the word 'some' there?—In those areas where an intensive system of forestry is practicable, there is very little grazing demand. The villagers in those areas have quite sufficient grazing outside the forests to meet their local demands.

67,985. I want to know the force of the word ' some ' there. Would you tell us whether the loss to the agricultural population would be more or less?—In remote areas where the intensive system of management is practised, the only sort of grazing that you get is from professional graziers, not village graziers.

67,986. Have you any experience of Champaran jungles?—No, I have never been there. I have personal experience only of Chota Nagpur and Hazaribagh.

67,987. *The Raja of Parlakimedi*: Do you exercise any restriction over sheep grazing in reserves?—We get very little of it as a matter of fact; there is some control.

67,988. What fees do you levy?—I think something like an anna a year. But very few sheep do come into the reserves; they mostly graze outside.

67,989. There are no open lands, I suppose, in your reserved forests? —There are, here and there.

67,990. Is any fee levied on grass cut for fodder and when removed by cart load?—Yes, fees are levied per cart load, per head load, per *tanghi-load* (a stick carried on the shoulder).

67,991. How much is charged?—Three pice a head load.

67,992. How much per cart load?—I have not got the figures here. I think it is something like eight annas. I cannot remember offhand.

67,993. You do not restrict the quantity taken?—We do not restrict it, provided the area in which the grass is cut is not under special control. We have to protect young trees coming up there.

67,994. Is there any objection to extending the forest laws to the zamindari areas?—None whatever. I believe the Maharaja of Chota Nagpur has applied, and certain other zamindars, but there does not seem to be much enthusiasm.

67,995. I suppose the entire regulations under the Forest Act can be extended to the zamindars if they apply for them?—If you mean for the protection of the forests, I think they will be available.

67,996. *Professor Gangulee*: Can you tell us something about the training of the forest subordinate officers?—They are trained in a number of places according to their different ranks. The Provincial Forest Service men are trained at Dehra Dun. Men of the ranger class are trained at Coimbatore. Forest guards and foresters are trained at Balaghat, Russel Konda, or Kurseong. Do you want me to describe the syllabus?

67,997. No. I only wanted to know where they were trained. Could you tell us what is the chief cause of the destruction of forests?—Fire, grazing and irregular cutting are the chief causes. The *sal* tree, which is the principal forest tree in this Province, can be felled but it will grow up within five years if you let it alone.

67,998. I understand that there was an attempt on the part of Government to acquire private forests?—Yes.

67,999. What happened to that policy?—The money was refused by the Legislative Council.

68,000. Do you mean to suggest that the members of the Council do not appreciate the utility of forest conservation?—I suppose some of them do.

68,001. On this question of the village panchayat system, could you tell us if you have made a start in the direction of village forests being managed by the village panchayats?—No.

68,002. Are you familiar with the somewhat similar arrangements in the Madras Presidency?—I have heard that such arrangements exist, but I have not been there.

68,003. Mr. Gibson tells us that the village forest should be managed on a simple system of regular working and the working scheme is to be in charge of the village panchayat. I wanted to know whether any attempt had been made in that direction?—That is an ideal which we have before us.

68,004. Has anything been done to realise that ideal?—I am afraid not.

68,005. Reverting to the question of the conservation of forests, this is, I take it, very important in the catchment area?—Yes.

68,006. Is any survey being undertaken in catchment areas where afforestation might take place?—No surveys have been carried out, so far as the areas owned by the zamindars are concerned.

68,007. Assuming that the Legislative Council grants you all the money you want, which catchment area would you first undertake to afforest?—I think the question of preserving such forests as already exist is more important than afforestation. The catchment areas are very wide and I do not know them all; they have not yet been surveyed by the Irrigation Department.

68,008. With regard to the classification of forests, could you tell us what exactly you mean by the expression 'third class forest'?—One means the minor forests, that is, forests yielding charcoal, fuel, and possibly poles for building purposes.

68,009. And the second class of forests?—Those are forests which are good enough to yield large timber for constructional purposes.

68,010. Could you tell the Commission whether the quality of grass grown in the third class forests is suitable for grazing?—There is a large amount of grass which we call spear grass, and you may perhaps be familiar with it.

68,011. Yes, I know it. The point really is this: In answer to Sir Thomas Middleton you said that the grass is there but that the cultivators do not care to graze their cattle. I just wanted to know whether the cultivators were aware of the quality of the grass in that tract?—I should think that they are fully aware of it. The Agricultural Department have informed me that excellent hay can be made from spear grass if it is cut before seeding and cured; if it is allowed to seed it becomes distasteful to cattle.

68,012. Are there any forest by-products in this Province?—Charcoal and *sabai* grass for paper.

68,013. Is *sabai* available in large quantities?—Yes, I imagine to the extent of about 100,000 *maunds* a year; the demand for it is very keen.

68,014. Are you carrying on any investigation in the direction of utilising these large quantities for paper manufacture?—*Sabai* grass is under a lease and has been so for the past thirty years.

68,015. *Mr. Kamat*: I would like to refer you to paragraph two of Mr. Gibson's note on page 418. He refers therein to certain lands near the agriculturists' village holdings and he says that, as forest, this area is of little value, but that it furnishes valuable grazing and

fodder supplies to the villagers; and then he adds: "There is an increasing volume of opinion in the Forest Department that such tracts should receive much closer attention than they have received in the past and that such lands should be made to yield to the people a much better return than they do now." Would you explain what is this opinion of the Forest Department which is gaining ground, and also what is the higher yield you might expect if proper use is made of such methods?—I think it is generally admitted that grazing is a much less economical use of grass than stall-feeding. If you could provide for rotational closures of such areas you would allow grass to grow until it is fit for cutting, when it can be used for stall-feeding, but local opinion is very much opposed to stall-feeding, I think. Grazing goes on throughout the whole of the rains, which is the period when the grass reaches its maximum growth and development.

68,016. Speaking of this local opinion on the one hand and the opinion of the Forest Department on the other, you must have observed that not only in this Province but in other Provinces as well, there is generally a conflict of opinion and a misunderstanding between the Forest Department and the people?—Yes.

68,017. I dare say if attempts were made not only to enforce policies but to explain facts to the people this misunderstanding might be removed?—We hope so.

68,018. I want to know whether attempts have been made by adequate publicity methods to remove the misunderstanding?—Do you suggest propaganda?

68,019. I do not suggest anything. I ask you what is being done. I can illustrate my point by asking you another question. You have stated, for instance, that in this Province the reserved forests are three per cent. of the total area. That fact taken by itself may convey nothing unless you also make it known to the people that the number of cattle in the Province is, say, so many millions, and that there is not sufficient grazing for all those millions of cattle on that three per cent area which you possess. The two facts ought to be published in order to carry conviction to the people. Have you done that?—I am afraid we do not collect statistics from purely agricultural areas.

68,020. Am I right, therefore, in saying that the misunderstanding is partly due to the relevant facts not being placed before the public?—I think you might say that that is the cause.

68,021. And, until that policy is pursued, this conflict on the part of the members of the Council, or the general public, or the villagers themselves is bound to continue?—Yes.

68,022. *Professor Gangulee*: Have not the members of the Legislative Council access to your publications?—I think so.

68,023. *Mr. Kamat*: Access to the publications is a theoretical means which does not in any country remove misunderstandings and, as in the art of advertising by posters, things have to be hammered into the brains of the people every day?—Access to publications presupposes a certain desire to learn.

68,024. Have you considered whether it is possible to have more publicity in order to remove this conflict of opinions between the public and the Forest Department? What steps would you take?—A propaganda scheme of lecturing, with lantern slides, has lately been suggested by this department to Government and I think the scheme will, in course of time, mature. But the individual members of the department are shy people who live in lonely places and some of them

are not keen on lecturing to the public in towns where they are not confident of success.

68,025. Take another fact. There are societies for the protection of cattle?—Yes.

68,026. The impression is that you have vast areas which you can open up for grazing?—Yes.

68,027. If you can disabuse the minds of these people of this misapprehension, probably all the societies for the protection of cattle may take up an entirely different policy?—Yes.

68,028. A good deal of this sort of thing is going on because the parties concerned have not worked out the facts together?—Yes.

68,029. Do you think that it is desirable, therefore, for the department to do its part by giving facts and figures to the people?—Yes.

(*The witness withdrew.*)

Mr. N. MEYRICK, General Secretary, Bihar Planters' Association Ltd., Motihari.

Replies to the Questionnaire:

QUESTION 1.—RESEARCH.—(*a*) (i) The association is of the opinion that more finance should be given to Government sugarcane experimental stations with a view to carrying out experiments on a bigger scale in connection with (i) the improvement of cane seed, the introduction of new types, and the breeding of new varieties, (ii) manurial experiments, to increase tonnage economically.

QUESTION 5.—FINANCE.—(*a*) Most agriculturists require finance for agricultural operations but have few facilities for obtaining it, and then only at a high rate of interest. The Imperial Bank of India cannot lend money on immoveable property, yet most of the larger cultivators have ample security for their borrowing on their land or on villages owned by them. The association is of the opinion that Government should assist by making it possible for the Imperial Bank of India to advance money on immoveable property.

QUESTION 15.—VETERINARY.—(*b*) (ii) No.

(iii) Yes, because the local boards will not grant sufficient funds for expansion. The control of transfers and disciplinary measures of the veterinary staff should be vested entirely with the department.

QUESTION 21.—TARIFFS.—In the case of the sugar industry, the reply is in the negative. On the other hand, it is essential for the future prosperity of the industry, and so of the sugarcane grower, that an import duty on sugar should be maintained sufficient to prevent the dumping of sugar in India from countries with large surplus stocks. If prices are brought to a low figure by dumping, a stage will be reached at which Indian mills will not be able to carry on; with the disappearance of the mills will come a large reduction of the area under cane, and so an enormous loss to the agriculturist. Nor will the consumers benefit by the removal of an import duty, as the closing down of Indian mills will eventually mean the country being entirely dependent on foreign sugar which, with no local competition, will naturally tend to raise prices. The association does not advocate a permanent import

duty but only for a period sufficient to enable a standard of cultivation to be reached that will allow of a considerably heavier tonnage per acre being produced than is at present.

Oral Evidence.

68,030. *The Chairman*: Mr. Meyrick, you are General Secretary of the Bihar Planters' Association?—Yes.

68,031. I think you yourself are a Planter?—Yes.

68,032. On behalf of your association, you have provided us with a note of the evidence that you wish to give. Do you wish to make any statement in addition to that, or any corrections?—There is no correction I wish to make, but I would like to add to my first answer which deals with cane. I understand that the policy of the Government is to open small experimental farms all over the Province and in that case I think it is very necessary that a small farm should be opened near Pusa so that that farm at any rate can get the benefit of the help of the people in charge of cane at Pusa to guide them in their policy of experiments.

68,033. Your association in 1877 was the Bihar Indigo Planters' Association and in 1893 its name was changed to the Bihar Planters' Association. Originally I think research work on indigo was one of the main objectives?—Yes.

68,034. Is your association carrying on any research work at the moment?—In England Mr. Reginald Brown is carrying out experiments on our behalf in the manufacture of paste.

68,035. And are you financing that in part or in whole?—Entirely; of course we have been given some money by Government. There was a cess on indigo and the balance of the cess amounting to some Rs. 12,000 has been given us in part.

68,036. Are you financing, or helping to finance, any other research in India or outside of India?—Not as regards indigo; we are spending money on propaganda.

68,037. Directed to what purpose?—To finding new markets.

68,038. Can you tell us something about that propaganda? How do you proceed?—The synthetic indigo has cut into the selling of natural indigo and is gradually taking the market that was supplied originally by the natural indigo. Calcutta has been our head market; we sold there and from there it was distributed all over the world before the synthetic came in. Now Persia takes a certain amount, and India; with those exceptions we have practically no markets. The idea is to find markets in Central Asia and along the Afghanistan way.

68,039. For use as a dye?—Yes.

68,040. Are there any other commercial purposes to which indigo or indigo paste could be put?—I think it could be used for medicine, more as a preventive of skin disease. I forgot to mention that we had some experiments with that too, through Mr. Hutchinson.

68,041. For any particular diseases?—Eczema, and that sort of thing.

68,042. It is known to have medicinal virtues; is it in the British pharmacopœia?—I do not know.

68,043. Do you remember the time when the synthetic indigo had not come into competition with the natural indigo?—No; I came here just about the time when the synthetic indigo came in.

68,044. Did the experience come as a surprise and a shock to the planting industry, or had they anticipated it some years?—I do not

think they had anticipated it. They had heard that synthetic indigo had been manufactured, but I do not think they ever anticipated that it would break the industry as it has done. I do not think it worried them more than the synthetic rubber does the rubber planter now.

68,045. Do you think the sad experience suffered by the indigo planting industry might be taken to heart by certain other producers who believe that the particular crop they are growing at this moment enjoys a monopoly which nothing is likely to disturb? If you were growing jute, would you be anxious to ensure that, so far as possible, nothing was left undone which might have the effect of protecting the future of your industry?—Yes; I certainly would be.

All I wish to point out is that these things come as a surprise and a shock to people who believe that a particular crop, or a particular area growing that crop, enjoys an unassailable monopoly.

68,046. Turning to your note of evidence, you mention the need for capital for larger cultivators; what do you mean by 'larger cultivators'?—I mean the zamindars.

68,047. Do you think that the zamindar lacks capital or enterprise?—I am inclined to think he lacks both.

68,048. You are satisfied that he lacks capital?—Yes; the majority of zamindars have no reserve fund to draw on.

68,049. Is that your own knowledge, or something which is repeated from mouth to mouth and accepted without sufficient examination?—That is my own knowledge of North Bihar.

68,050. Are you referring to the European zamindar or the Indian zamindar?—Chiefly the Indian zamindar.

68,051. You point out that the Imperial Bank of India, according to its charter, is not allowed to advance money on immoveable property. How about the joint stock banks? Is there any reason why they should not advance money on immoveable property?—I am referring to North Bihar; there are no joint stock banks up there which do business of that kind. I understand that at the time of Sir Thomas Holland's Commission (the Indian Industrial Commission) it was recommended that the Imperial Bank should open branches with a view to help agricultural purposes.

68,052. You do not think that a well regulated land mortgage bank is the proper instrument for providing long term credit?—I do; but there is no such bank in North Bihar.

68,053. I am interpreting your suggestion. You think a land mortgage bank might be created. You will agree that if the Imperial Bank of India is to be in a position to lend money on immoveable property, the bank would require a very extensive agency in order to satisfy itself that the borrower not merely held sufficient security but also that he was the sort of man to whom the bank could lend?—I understand that. I would advocate that either the charter of the Imperial Bank of India should be altered or an endeavour should be made to open a bank such as the one you suggest.

68,054. What exactly is the business of the typical planter in the area with which you are familiar? Does he cultivate his own land by paid labour or is he, in fact, a zamindar?—The great majority cultivate their own land by paid labour.

68,055. What is the size of a typical holding?—About a thousand acres to each planter.

68,056. We have no sort of connection with the Income-tax Commissioners. Could you give us some indication of the net profit to be

expected in the average year, per acre, from properties of that sort?—It is very difficult to say, because it varies.

68,057. In general terms, do you see any reason why young men of the middle class amongst Indians, who can command the necessary capital, should not find profitable and healthy occupation in developing properties of that sort?—I think they should, provided a sufficient area is taken. With a small holding it would be very difficult for a man to make it a profitable occupation.

68,058. What do you regard, in the area with which you are familiar, as the minimum economic holding for a man of the type I have mentioned?—One thousand acres is the minimum a planter could work economically.

68,059. Could you give the Commission any indication of the amount of capital, fixed and working, which would be required by a man going into a holding of that sort *de novo*?—Including the capital to buy the land?

68,060. The more information you could give us the better?—It varies of course considerably for various districts; the average would be about Rs. 200 an acre.

68,061. Would that include all expenses?—That is the capital value of the land.

68,062. That is the purchase price of the land?—Yes.

68,063. Taking the ordinary area which has not been developed for large scale farming, is a certain amount of capital required for making it fit for large scale cultivation?—A certain amount would be required; ten per cent of the capital would be required.

68,064. Ten per cent of Rs. 200?—Yes.

68,065. You mean about Rs. 20 an acre for fixed capital?—Yes.

68,066. That gives Rs. 220. Now, how about working capital?—I should say about Rs. 70 an acre would be required.

68,067. That makes Rs. 300 an acre all round?—Yes.

68,068. *Professor Gangulee*: Are these estimates for sugarcane cultivation?—I am talking of an area under all crops, sugarcane, oats, wheat and paddy.

68,069. *The Chairman*: So, three lakhs of rupees is required as capital for the opening and developing stages of an economic holding on the scale with which you are familiar in your part of the Province?—Yes; I think quite that.

68,070. That means that the door is practically closed to all except the very well-to-do?—Yes; it is no good going in without capital.

68,071. The Sugar Producers' Association has advocated the establishment of a centralised sugar school to operate for the whole of India, at which Indians may be taught the principles underlying sugar manufacture. The suggestion is that a post-graduate course should be given at this school to students who have already taken the B.Sc. degree. Have you any views on that suggestion?—I think I hold the same view too. There should be a central sugar bureau controlling sugar experiments.

68,072. Do you support the Sugar Association's view that a publication, giving technical information regarding sugarcane cultivation and sugar manufacture, would be a valuable asset to the interests concerned?—Yes.

68,073. Do you think your association might be persuaded to shoulder some share of the risk of publishing a journal of that sort? Would they

consider it?—They would certainly consider it, but they are not full of funds.

68,074. Has your association, or have you, any views as to the minimum economic size of a sugar factory?—No.

68,075. You have no knowledge of that?—No.

68,076. It has been suggested that Government might encourage private enterprise to set up sugar factories by itself setting up a small sugar factory, in order to prove that the cultivator is willing to sell his cane to a factory at prices which may make the manufacture of sugar remunerative. Do you think it is necessary that Government should go into the business of production in that way?—I do not think it is necessary now.

68,077. You do not advocate it?—No.

68,078. You think there is no doubt that the cultivator would be willing to sell his cane to a factory, provided he can get prices which would leave him a margin of profit?—Yes.

68,079. You think there is no doubt?—There is no doubt.

68,080. Have you any views as to the Sugar Bureau's cable service?—We get it sent to us every week.

68,081. Is it valuable?—It gives us information as to what the prices and the prospects are. I consider it valuable for these reasons.

68,082. Would you regret its discontinuance?—Yes.

68,083. That is your definite view?—Yes, it is my personal view.

68,084. Have you any views that you would care to express about the efficiency or the reverse of the Sugar Bureau?—I think it has been working very efficiently. I am not quite sure whether the work done at Pusa comes under the Sugar Bureau, but that has been very valuable. They have introduced four new types of cane and, had they more money and staff, I believe they would have been able to introduce still more types.

68,085. So far as your area is concerned, would it be true to say that Pusa has in fact taken the place of the provincial Agricultural Department in these matters?—As far as my association is concerned, most certainly it has.

68,086. Have you any criticism to offer or any suggestions that you would care to make about Pusa?—I think that Mr. Sayer, who has been in charge of the cane work there all these years, should continue in charge. I understand it has been handed over now to Mr. Henderson, who has other work to do. He is in charge of the cane there, and I believe he has gone away now, and will be away till February on other duties. That does not seem to me to be the right way to look after the cane work. The man should be permanently in the place where he has his work.

68,087. Do you realise that Pusa is the Imperial Agricultural Institute?—Yes.

68,088. Do you think that any group of villages in one Province has a right to expect that officers of the Imperial Service should devote their time and attention to them particularly?—I do not mean that. I mean that he should be entirely in charge of cane work, and not other work. Other work will take him away, and in this case it will take him away for a period of three months.

68,089. *Sir James MacKenna*: Can you point to anything that the local Department of Agriculture, as distinguished from Pusa, has done for agriculture in North Bihar?—No, I cannot.

68,090. Do you know the Sipaya Farm?—I know of it.

68,091. You have not been to it?—No.

68,092. Have you any knowledge of the results achieved in the cattle-breeding experiments carried out there by Mr. Mackenzie?—No, I have no personal knowledge of it.

68,093. Is that a suitable site for a sugarcane farm?—I do not know it sufficiently to express an opinion.

68,094. What do you think would be the most central site for a departmental farm, a site which would be convenient for the agriculturists of a composite area? You have already suggested one near Pusa?—I think that is very central.

68,095. Would that meet the requirements of a considerable area?—I think so, for the sugarcane-growing area. It is not difficult for Champaran either; it would be very convenient for Champaran.

68,096. Have you any experience of the Pusa cross-bred bullocks? Have you any of them?—I have a few.

68,097. How do they stand up to work as compared with the local breeds?—My experience is that they work well; they stand lots of work.

68,098. Have you any experience of their liability to rinderpest?—No.

68,099. Do you know whether they are simultaneously inoculated at Pusa?—I do not know.

68,100. The indigo cess has been given up? It is not collected now?—It was given up some years ago.

68,101. Have you any experience of co-operative societies. Do you run any yourself?—No.

68,102. *Professor Gangulee*: Is it your view that sugarcane cultivation is being extended in Bihar and Orissa?—In North Bihar, yes.

68,103. Especially in North Bihar?—Yes, it is being extended there.

68,104. Do you think there is room for further extension?—Yes.

68,105. A great deal?—Yes, a great deal.

68,106. What is the limiting factor? Is it the supply of water or the manurial question?—I do not think that the supply of water is the limiting factor. Very often, it is a case of finding the canes that can be grown economically and pay the grower.

68,107. Do you think adequate attention to these problems of sugarcane cultivation in Bihar and Orissa has been given by the provincial Department of Agriculture?—I do not think it has, as far as North Bihar is concerned.

68,108. Does your association receive any assistance from the provincial Department of Agriculture?—No.

68,109. You do not come into contact with the Deputy Directors of Agriculture, for instance?—No.

68,110. In its note, your association says that it does not advocate a permanent import duty but only for a period sufficient to enable a certain standard of cultivation to be reached. Have you any views as to the period? How long would it be necessary to have an import duty on sugar?—I think that would largely depend on the money spent by the Government in experimental farms and getting to what I have already mentioned in one of my answers, namely, an increased tonnage of cane. An increased tonnage of cane per acre will mean that the

grower will be able to supply cane to the mill at a price that will enable the Indian mills to manufacture sugar to compete successfully with sugar from foreign countries.

68,111. Taking the present rate of extension of sugarcane cultivation and the existing conditions, how long do you think it would be necessary to have an import duty?—Twenty-five years.

68,112. *Mr. Kamat*: With reference to that last point, how much increase do you think there should be in the present import duties on sugar?—I am not quite sure what the present import duty is; I think it is twenty-five per cent. *ad valorem.*

68,113. I think it is Rs. 4-8 a hundredweight. You suggest some increase of the duty. What is the present rate, and what increase do you suggest?—I do not remember that I did suggest an increase. I think I advocated its retention; I do not think I advocated an increase.

68,114. You say that an import duty on sugar should be imposed sufficient to prevent the dumping of sugar in India?—Yes.

68,115. The present duty is not sufficient to stop dumping, and you want to carry it to a pitch which will stop the present dumping. What should that pitch be?—We are certainly at very low prices for sugar now. I do not think we have got to a stage where dumping is so great that it will necessitate any radical change in the import duty. If the dumping is likely to bring the prices lower than they are at present, I certainly think the rate should be increased; I would suggest a thirty-three per cent increase.

68,116. Supposing the present rate of import duty on sugar is increased, by mere virtue of that increase is it likely that sugar factories would come into existence in the country?—I think so, certainly.

68,117. You have told us just now that it would take about twenty-five years for the experimental farms to evolve such types of canes as would give a yield per acre approaching that of other countries?—I think I have not been understood. What I intended to say, and I think I said it, was that this import duty should remain for twenty-five years. It will be necessary for them to give time to get the cane growing on an economic basis which will pay the growers sufficiently well.

68,118. If that is the case, my question is: how do you expect that, immediately the duties are increased, more factories will come into existence?—The higher the import duty, the greater the encouragement to the manufacture of sugar in this country.

68,119. Is it a fact that Messrs. Begg Sutherland and Co. examined the possibility of having sugar factories in South Bihar and after investigation they found that there was no possibility of having any factories in that part of the Province?—I believe they made inquiries with a view to establishing a factory in the Shahabad district but the chief reason for not opening a factory there was that they could not get a guarantee of an area sufficient to start the erecting of the mill. There is no cane grown there at present and they wanted a guaranteed area.

68,120. Are you conversant with sugarcane plantations in the south of India?—I know nothing about them.

68,121. *Mr. Danby*: Do you think that the cultivators would grow cane to sell to the mills if the price of sugar dropped below its present level?—No.

68,122. Do you know the cost to the cultivator, approximately, of producing a *maund* of cane?—Six to eight annas. It depends largely on the outturn as the result of your expenditure.

68,123. Can you say what the cultivators are now being paid for their cane by the mills?—Five-and-a-quarter annas. Then there are royalties and a premium for carting the cane.

68,124. Can you tell us what the cultivators actually receive?—About seven-and-a-half to eight annas.

68,125. *Professor Gangulee*: Including the premium?—Yes.

68,126. *Mr. Danby*: There is very little profit then?—Practically no profit.

68,127. Are there any indications that the Coimbatore cane has deteriorated since its introduction three or four years ago?—Certainly.

68,128. *Professor Gangulee*: What are the reasons for this deterioration?—The deterioration takes place in every type of crop. It takes place, for example, in indigo. It is essential to go on finding new types with a view to getting an increased tonnage per acre, and also to find types that will better withstand drought and insect and other pests. New types will deteriorate unless kept up to the original standard by continual importation.

68,129. *Mr. Danby*: Do you think that the cultivators of cane, generally, are under the impression that sufficient interest is not being taken in the research work now, as it used to be?—Yes, they are.

68,130. Is it the experience of cultivators that cane cannot be grown in North Bihar without manure?—Yes.

68,131. In North Bihar no manures for experiments have been distributed by the Agricultural Department?—No.

68,132. *Professor Gangulee*: What manures do the planters usually use?—Farm-yard manure, waste products of indigo, sulphate of ammonia and a number of other mineral manures.

68,133. *Mr. Danby*: You told us that money was spent on experiments. After the Coimbatore cane had been selected as suitable, was the cost of growing these canes for seed on a large area guaranteed to the Planters' Association?—I think so.

68,134. Would the working capital that you gave us as necessary for a thousand acres include the cost of bullocks and buildings?—I have not taken into consideration the cost of the livestock and buildings.

68,135. *The Chairman*: Would you think over the figures and examine one or two conflicting cases and let us have a statement* at your convenience?—Yes.

68,136. *Mr. Danby*: Do you think that it is necessary to have more veterinary dispensaries in North Bihar?—I think there is room for a considerably greater number. The whole countryside is starving for want of them. There is no means for the great majority of owners of livestock to get to a dispensary.

68,137. The cultivators are generally quite ready now to have their cattle inoculated and treated by the Veterinary Assistants?—Yes, certainly.

68,138. *Sir Thomas Middleton*: You gave us the figure of six annas to eight annas as the cost of growing a *maund* of cane and you have indicated that the cost varies with the yield per acre. What is the cost to the cultivator in terms of rupees per acre?—The outturn per acre varies according to the standard of cultivation adopted. For instance, the members of my association who have a fairly high standard get a very much bigger outturn than the ryot does.

**Vide* Appendix on page 504 (*a*).

68,139. Taking the range of six to eight annas per *maund*, what is the figure per acre that you had in mind for the outturn?—About Rs. 100 an acre.

68,140. What would be the weight of cane?—About 350 *maunds* an acre.

68,141. That seems to me a heavy average yield?—I think that with a high standard of cultivation and a good outlay on manure that can be reached.

68,142. That output would bring your cost down to six annas a maund. Will you please think over these figures and let us have a statement* as to the cost of producing an acre of cane, allowing a margin for a yield of 300 to 350 *maunds* an acre?—Yes.

68,143. You stated as your view that there should be a thousand acres of land to constitute an economic holding in North Bihar. Would it not be possible to run an economic holding on a smaller area, say 200 or 300 acres?—I do not think it would be to members of my association.

68,144. In beginning your evidence you stated that one of these demonstration farms which the Bihar Department of Agriculture is contemplating should be situated near Pusa. Do you think that Pusa itself does not serve the purpose?—I do not think it does. I do not think that there is any definite policy to carry on cane work or to get hold of the ryot and show him how cultivation should be done.

68,145. They are growing considerable areas of cane in Pusa?—Certainly, but it is all on a large scale, which the ryot will not appreciate.

68,146. Your object is to get the cane grown under the conditions that the ryot grows it?—Yes, for demonstration purposes.

68,147. *The Chairman*: Could you give us an idea of the comparative net profits per acre as between a well conducted holding under an experienced planter and that of a small cultivator?—I do not think I could, off-hand.

68,148. Is the difference marked?—Yes, it is very marked.

68,149. *Sir Thomas Middleton*: What would be the ordinary yield per acre on the cultivators' holding in the district in which the planters are getting 300 to 350 *maunds*?—I should think about 150 *maunds* an acre.

68,150. *Dr. Hyder*: Do you know the representative size of a holding of a planter in Java? You require one thousand acres. What would be the size of a representative holding of an European planter in Java?—I have no idea.

68,151. *Babu A. P. Varma*: With regard to your estimate of cost of Rs. 200 per acre, I want to know whether you meant cultivation by western methods or by the local methods?—I was referring to cultivation by western methods.

68,152. Would there be any difference if the local method were followed?—It will certainly be less if you spend less on manures and so on.

68,153. What is the price of the land?—An average of Rs. 200.

68,154. Only the price of the land?—Yes.

68,155. Over that you have the cultivation expenses?—Yes.

68,156. How many acres make one *bigha* in North Bihar?—The *bigha* varies according to the length of the *laggi*. The *laggi* varies in Bihar from 6 to 12 cubits. A *bigha* measured with a 7½ cubits *laggi* is approximately an acre.

---

* *Vide* Appendix on page 504 (*a*).

68,157. When you said that the cost of the land would be about Rs. 200, what class of land were you thinking of?—The average class of land, say of a thousand acre holding.

68,158. Can you suggest what would be the cost if it were to be cultivated by local methods?—No; that would only be a very rough idea; perhaps it would be from about two-thirds to a half of the cost that would be involved in the other method.

68,159. You want the control over the Veterinary Department to be taken away from the local bodies?—Yes.

68,160. And you say the reason is that the local boards will not grant sufficient funds for expansion? May I know why they will not be willing to grant sufficient funds?—They prefer spending the money on other things such as education.

68,161. But with reference to this particular department, why should they be unwilling to spend more money?—My experience is that they do not spend sufficient money.

68,162. Is it because the department is not working well?—I do not know what the reasons are; I am merely speaking from my own knowledge. I know, as a matter of fact, that sufficient money is not being spent.

68,163. Could you kindly tell us what is the nature and extent of the control which the district boards have over the department?—I am afraid I cannot tell you that in detail. I believe that they have entire control over the amount that shall be spent on this department.

68,164. Is not supervision necessary for the improvement of the department?—Most certainly it is.

68,165. Do you not think that the local bodies supervise the work of the department better than the officers of the department itself?—I think myself that if there were more higher grade officers it would be much better supervised by the department than by the local boards.

68,166. In that case it would be at a higher cost, would it not?—Yes; the local bodies presumably do not keep a large staff for the work.

68,167. Would you kindly tell us what contributions the local bodies make towards the upkeep of the department?—I have no idea.

68,168. *Mr. Danby*: Do you not think that 200 to 250 acres would be a more correct area for an economic holding than the 1,000 acres suggested by you?—Certainly not for the members of my association.

68,169. For the middle class Indian that would be the figure?—Yes.

68,170. So that the figures you gave were for European planters?—Yes.

68,171. *The Chairman*: Apart from the opportunity to employ more capital, are there economic advantages to be expected from working a holding of 1,000 acres as compared with 250 acres, for planters of the type of your own members?—I do not think a planter would get a sufficient income to keep going, on less than 1,000 acres.

68,172. *Mr. Danby*: A European keeps a larger staff than an Indian cultivator would: is that not so?—Yes, he keeps a much larger staff.

68,173. So that his overhead expenses would be much more?—Decidedly so.

68,174. *Professor Gangulee*: But supposing a landlord's son wants to go in for farming on a large scale: for him would you say that 250 acres should be an economic holding?—I think so; his standard of living is not so high as the planter's, nor does he keep up the same staff.

68,175. *The Chairman*: The point really is, what size of holding is required to obtain the economic advantages of large scale farming? What is the minimum holding required to secure the economic advantages of large scale farms as compared with the ryot's small scale farming? You think it is about 250 acres?—Yes, from 200 to 250 acres.

68,176. And when it is alleged that the fact that Indians keep a smaller staff than Europeans, and that that is a reason for supposing that the Indian can live economically on a smaller holding, surely that should be corrected in some measure by the statement that the Indian does not as a rule farm on as high a scale as the European? If the Indian was to attempt the same scale and type of cultivation as the European, would the Indian require as many servants on the land?—I do not think so, for this reason that he has got his entire family with him, whereas the European has not. The Indian's family would take on the farm; whereas the European would be looking after the farm individually, the Indian zamindar would have a family of perhaps twelve members.

68,177. Are you suggesting that the zamindar who has got a farm of, let us say, 500 acres, would have at his disposal a family able to take a personal hand in the business of farming?—Certainly so in the supervision of the farm.

68,178. *Sir Thomas Middleton*: How many acres can an active planter supervise effectively?—I think 1,200 acres is as much as it is advisable for one man to look after; if he were to get a larger area to supervise, without any assistants, he is very likely to be faced with great difficulty in the work of properly supervising the farm.

68,179. The whole of that area would be under tillage?—Yes.

68,180. *Sir Henry Lawrence*: I understand you to say that the present price of sugar is ten rupees a *maund*, and that sugarcane cultivation is not profitable to the ryot?—No.

68,181. And you think that, by raising the import duty, sugarcane cultivation could be and should be made profitable to the ryot?—Yes, for this reason, that the mills would be able to afford to pay more for the cane.

68,182. The figure you give is a rise of some thirty-three per cent on the present import duty?—Yes.

68,183. Your proposal is that it should be raised to Rs. 6 a hundredweight?—Yes.

68,184. *The Chairman*: To return to the subject with which we were dealing a moment ago: Do you know of any case where the sons of a zamindar provide the labour on a holding of 250 or 500 acres?—I have not, in my experience, come across any 250 acre holdings. I do not know of any zamindar with a holding of that size.

68,185. On what do you found yourself when you suggest that such zamindars have family labour at their disposal whereas the European has not such labour?—The zamindars always have their families living with them, whereas the European's family is perhaps many thousands of miles away from him, and when his children grow up they go elsewhere, unlike the children of the zamindar who would be living with the zamindar in his house. It is, as you know, not the custom of Europeans to have their brothers and cousins and such other relations all living with them, as the Indians do.

68,186. Could you give us any idea of the number of employees on a typical 500-acre holding under European management?—I could not, offhand.

68,187. But surely you must have some rough idea. What would it be approximately?—It would vary according to the work they are doing. Do you mean merely the supervision of the staff or the labour as well?

68,188. I see; when you referred to the zamindar's sons, you were alluding to the question of the supervision of the staff only?—Yes.

68,189. *Babu A. P. Varma*: Would you agree with me when I say that 100 to 150 acres of land would be more than enough for a middle class Indian cultivator of the zamindar class?—I have already stated that it would be 200 to 250 acres.

68,190. Not 150 acres?—No.

(*The witness withdrew.*)

Moulvi SAIYID MUHAMMAD AHSAN KHAN, Zamindar and Secretary of the Barh Agricultural Association, Barh, District Patna.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) (i). In my opinion the great need for the development of scientific agriculture is to have a better organisation. At present there seems to be a shortage of competent staff in the Agricultural Department of the Government to conduct scientific experiments in agriculture on sound and proper lines. The work is thus restricted. It would be advisable that experiments of general application made by the central organisation of the departments in the Provinces should be demonstrated on a larger scale than at present on farms started in the districts and sub-divisions, particularly with regard to improved seeds and manures. The officers of the Agricultural Department should be familiar with the language and conditions of the country if results of experiments are to be of any practical value. The great difficulty in the way of improving agriculture is the appalling poverty and ignorance of the cultivator. The department must have a sympathetic feeling towards the cultivator. In order to establish contact with the cultivator the agency of village co-operative societies and agricultural associations should be freely utilised. It would be easier to approach the cultivator through these societies. "Co-operation and sympathy" should be the motto of the department.

Systematic efforts should be made to promote agricultural co-operation as in Great Britain. In each Province an agricultural organisation society on the lines of the English or the Scottish agricultural organisation societies should be formed. This organisation will be purely propagandist and will branch off into so many small societies all over the country and arrange for the purchase of seeds, manures, implements and other requisites for the cultivator. The Provincial Governments should make an annual grant to every society started with this object. Without co-operative effort the life of the cultivator with small holdings will be difficult.

The true line of development should be directed towards the improvement of indigenous methods and it would be simply useless to foist, on the cultivator, western ideas and principles. Indian agricultural practice has been built up on the traditional customs of many years and the principles applied by the Indian cultivator are based on conditions of climate and soil. Any sudden change from his traditional methods and implements would necessitate the

employment of capital of which he has none. Though it is admitted that the modern power-cultivator would save much of his time, he has no capital to invest in such expensive modern implements. A power-cultivator on a small holding would not be a profitable innovation. Custom farming has made great strides in the United States of America and I would suggest that it could be safely adopted in India with the assistance of the Government. The driving force must come from the State to advance India's basic industry, agriculture. The Department of Agriculture should make all possible efforts to bring home to the cultivator the resultant advantage that a change in methods would bring him, as the cultivator is naturally opposed to all innovations owing to his restricted means and want of education and his conservatism. The results of modern agricultural science should be presented to him in a simple form so that it may be made easy for him to apply them to his advantage.

There is a great need for the supply of pure seed to the agriculturist. For this purpose I would suggest that the Agricultural Department should have an efficient organisation for the distribution of seeds. Small village societies should be formed with the collaboration of the Agricultural and the Co-operative departments to supply pure seeds to the agriculturist.

I would suggest the formation of an All-India central chamber of agriculture on the analogy of the Central Chamber of Agriculture in England to promote and advance the best interests of agriculture in India, and with that view to watch over all measures affecting the agricultural interests in the Indian Legislative Assembly and provincial legislatures. All the agricultural bodies in the country should be federated with the central chamber. Its constitution should be the same as that of the English Central Chamber and the work of the chamber should be conducted by an elected council. The chamber should also have on its roll members of the Indian Legislative Assembly. In addition to a general business committee, other committees should be appointed to deal with special branches of agricultural interest.

As regards finance, I would suggest that the co-operative banks should advance loans to the cultivators for agricultural purposes at a lower rate of interest. The Indian cultivator is greatly handicapped for want of funds; and if it were made easier for him to obtain loans from the co-operative banks at a lower rate of interest it would enable him to be better equipped for his work.

(ii) (*b*) In my opinion each district should have a good research laboratory to deal with cattle diseases and a small dispensary attached to each sub-division for the ordinary needs of the locality. The prosperity of the cultivator is dependent on his cattle and therefore the organisation to fight cattle diseases should be as efficient as possible. Veterinary Assistants trained in the vernacular should be deputed to each village in the sub-division.

(*c*) Elaborate attempts should be made to investigate the various diseases of fruit trees, such as, mango, guava, fig and date-palm, and evolve measures for preventing or controlling such diseases. The question of the development of fruit culture has not been properly tackled and it seems necessary that knowledge of the correct methods of budding, grafting and layering should be obtained. Owing to disease the quality of the fruits has much deteriorated and proper investigation would help to improve the quality.

QUESTION 2.—AGRICULTURAL EDUCATION.—(i) The number of agricultural institutions is very inadequate at present. This is partly

due to want of good teachers with knowledge of practical agriculture. There is no separate college or school for training in agriculture in this Province. The Sabour College was abolished some time ago. There should be at least one college and two or three separate schools for agricultural education.

(ii) In the Province of Bihar and Orissa each district requires an efficient agricultural institution. I would suggest that in primary and secondary schools agriculture should be taught as a subject, coupled with some practical training on the farm. If, for want of funds, separate agricultural schools cannot be opened, this would be the best possible arrangement.

(iii) The teachers should be taken from the agricultural classes of the Province and should be fully trained for the work.

(iv) The attendance at the existing institutions is rather disappointing and is not what it ought to be, the main reason being that no encouragement is offered to boys of the agricultural classes and no proper interest has been created in the matter of agricultural education. The agricultural classes are backward and there is need for their encouragement and enlightenment.

(v) No incentives are offered at present. Stipends and scholarships should be awarded to boys of the agricultural classes in order to stimulate interest and attract them to agricultural schools. Small money prizes should also be granted on the basis of examination results.

(vi) No. I have studied the figures of all the Provinces and have found that the proportion of the children of the agricultural classes is very small.

(vii) Some modifications are necessary in the existing courses of study. I would suggest a shorter course of study for the sons of zamindars and small landowners and, for this purpose, vernacular agricultural schools should be established in rural areas. The course may be fixed at two years in practical farming and general training in agriculture.

(viii) (*a*) Nature study is very essential as a basis for training in practical agriculture. It would tend to improve the faculty of observation in the children. Great emphasis should be laid on the teaching of simple nature study and rural object lessons.

(*b*) School plots are also necessary and the children could obtain useful lessons from them.

(*c*) School farms may be considered to be a necessary adjunct to the practical side of the training.

(ix) The opportunities for careers open to the students are very few. They can only look to appointments in Government posts which are, after all, very limited in number.

(x) Equally attractive prospects should be offered to the students as those of any other public service or profession. The qualification in agriculture should also be made an avenue to appointments in posts in the Court of Wards and the Revenue Department.

(xi) No.

(xii) Incentives should be offered and hopes held out for future prosperity. Peripatetic lecturers or teachers should be employed to hold meetings in order that the latest advances in agricultural science may be brought before practical farmers, and elementary evening schools should be opened for the purpose.

Moulvi Saiyid Muhammad Ahsan Khan.

(xiii) (*a*) The great need is for a better general education in rural areas so as to create, in the students, an interest in their surroundings. To extend primary education amongst the agricultural classes, more schools should be opened which would impart general education and give a grounding in the rudiments of agriculture. Suitable teachers should be deputed by the Agricultural Department to rural areas to help the agriculturist in his local difficulties; he could be advised as how best to prepare his fields and solve his local problems, on which the teachers should obtain complete knowledge by touring round the villages. The district boards, with the assistance of the Agricultural Department, should provide facilities for the instruction of young labourers in hedging, ditching, ploughing and harvesting. The results are bound to be satisfactory if suitable teachers are employed. The teachers should also visit the demonstration farms in the districts and sub-divisions, see how the results of experiments carried out there could be of utility to the agriculturists and then explain those results to them in the vernacular.

(*b*) The funds should come from the State. The agricultural associations in the districts and sub-divisions should be subsidised by Government to start more schools for the purpose and undertake all such work as would help the agriculturist in his local problems and difficulties. These associations should be controlled by the Agricultural Department and should be advised by the department on any methods and experiments of economic value.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) The system of agricultural loans introduced by the Government has to some extent been responsible for improvement in agricultural practice. Successful experiments carried out by the Agricultural Department to prevent and control cattle diseases and to increase the productivity of the land have greatly improved and influenced agricultural practice.

(*b*) All the leading local zamindars and cultivators should be invited to attend field demonstrations and, through the agency of agricultural associations in the sub-divisions, it would be easy to approach and attract the cultivators. The methods should be explained to cultivators in the vernacular in a simple manner.

(*c*) Propaganda work and a sympathetic attitude towards the cultivators would be helpful. As I have stated above, the agency of the agricultural associations should be utilised for this work. The cultivator, though conservative in his ways, is in touch with the agricultural associations and any expert advice conveyed to him through that agency would be readily accepted and adopted.

(*d*) A farm started by the Agricultural Department at Patna for demonstration purposes failed some time ago. The farm did exceedingly good work in the beginning but owing to, perhaps, lack of supervision and inefficient management it was afterwards abolished.

QUESTION 4.—ADMINISTRATION.—(*a*) I would suggest that provincial departments should avail themselves of the services of experts at the Pusa Agricultural Research Institute more freely than has hitherto been the case. In my opinion the posts of Economic Botanist, Agricultural Chemist and other experts in the Provinces should be abolished and the services of the experts at the Pusa Institute utilised. The experts at the Pusa Institute should be invited by Provinces to investigate and advise on local problems. Any other general problem which cannot be studied properly by provincial departments could be referred to the Pusa Institute. I would also suggest that some sort of control should be exercised by the central

organisation at Pusa over the provincial departments. In fact, the provincial departments have become independent of Pusa. If the results of scientific advice are to be of any economic value to India as a whole, Pusa should be made to play an important part in the agricultural organisation of the country.

(*b*) I would favour an increase in the scientific staff of the Government of India. The central department should have a strong staff of specialists, whose wide knowledge and experience could be made available, when required, for consultation by all Provinces, especially in connection with common crops like tobacco, sugarcane, rice, et cetera. The work should be controlled by the central department at Pusa.

(*c*) (i) The services offered by the Agricultural and Veterinary services are not adequate for the requirements of the agriculturists. The Agricultural Department should be furnished with funds to educate the agriculturist through the medium of film propaganda and to appoint additional staff as agricultural and veterinary assistants in the rural areas for practical demonstration work.

(ii) The railway and steamer freights for the transport of seeds, manures and agricultural implements should be reduced in order to offer facilities to the agriculturist in the matter of transport.

(iii) In rural areas it is necessary that there should be roads for cart traffic.

QUESTION 5.—FINANCE.—(*a*) A State co-operative bank with branches in the villages should be started. Through the medium of a co-operative bank with branches in every village the advantages of manures, seeds, modern agricultural implements and the provision of better means of transport will be brought within the reach of the cultivators and consequently the harvest will be more plentiful.

(*b*) I am inclined to think that the provision of credit facilities for agricultural enterprise by the co-operative banks appeals more to the cultivators than the system of *taccavi* loans. The obvious reason for this is that co-operative banks charge a comparatively low rate of interest on the loans advanced to the cultivator. It seems, therefore, difficult to induce the cultivator to avail himself of the system of *taccavi* loans, as it is not possible to rid his mind of the bias in favour of the co-operative credit system.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) (i) In some cases the causes of borrowing are real and in others due to extravagance in connection with marriages. The real causes are failure of crops and other unforeseen calamities.

(ii) The sources of credit are mainly the *mahajan* and the brother cultivator who is in prosperous circumstances.

(iii) Much of the borrowed money goes to increase the extravagance in the household of the cultivator and an attempt should be made to check this evil of extravagance. In the case of loans from the *mahajan*, the interest is usually so high and usurious that the interest exceeds the capital and then it becomes very difficult for the cultivator to repay the loan.

(*b*) I would suggest that the Usurious Loans Act be enforced in order to deal with rural insolvency. This would be the most effective remedy.

(*c*) I would favour the taking of measures to restrict the credit of cultivators by limiting the right of mortgage and sale. It would be better if non-terminable mortgages were prohibited.

Moulvi Saiyid Muhammad Ahsan Khan.

QUESTION 7.—FRAGMENTATION OF HOLDINGS.—(*a*) The only way to reduce the loss in agricultural efficiency is to introduce the common farming system as prevalent in some parts of Europe and, also, the general application of co-operative methods which have diminished to some extent the difficulty of small farming and marketing. The climatic, geographical and economic conditions call for large scale farming in India and something in the form of legislation will have to be undertaken to ease the real difficulties which arise on questions of inheritance and ultimately lead to uneconomic subdivision.

(*b*) The law of inheritance presents the greatest obstacle, particularly in the case of Mahommedans. In order to overcome the obstacle I would suggest that one capable member in a Mahommedan family should manage the whole property himself when there are many co-sharers, and distribute the income accruing according to the share of each. The Hindu joint family system will, of course, help consolidation to a great extent. Something in the form of legislation should be undertaken so as to allow small holders to make their holdings compact by exchange among themselves, according to the circumstances of the case. In the majority of cases one tenant has several strips of lands in different parts of the common field.

(*c*) I do not think that legislation would be necessary.

QUESTION 8.—IRRIGATION.—(*a*) (i) Irrigation is necessary over the greater part of the country owing to insufficient rainfall and it is very important that the water requirements of crops should be properly studied. The canal system of irrigation in the Province has been satisfactory, to some extent. A suitable method of surface drainage for the low-lying lands of Bihar should be devised by the Agricultural Department.

(ii) Tanks and ponds are not much in use in this Province as a means of irrigation. I would suggest that an investigation should be made into the possibility of a system of irrigation by means of water storage in tanks and small reservoirs. For instance, in Rajgir there are natural springs from which water can be stored in a reservoir for irrigation purposes.

(iii) Alluvial areas in the Province are under irrigation from wells. Pumping and boring operations are in progress in the Province and I would suggest that the use of the *rahat* pump or the iron Persian wheel for irrigation from wells should be popularised among cultivators.

QUESTION 9.—SOILS.—(*a*) (i) Underground drainage has been successfully tried in European countries and I would suggest its adoption in India with a view to improving dense impervious clay soils. The excess of water in certain areas should also be removed by surface drainage. The main channel should be dug along the boundary of the fields, if possible, and small channels may be dug to remove the water from the low-lying parts into the main drain. The soil can also be improved by proper manuring.

(ii) Alkali land may be reclaimed by first treating with gypsum if sodium carbonate is present, then under-draining and flooding to wash out excess of soluble matter. This method is said to have given wonderful results in the United States. Hilgard, who has made researches into alkali soils, advocates flooding with irrigation water, accompanied by thorough under-drainage, as the best treatment for alkaline conditions. This method may also be tried in India.

(iii) Huge earthen *bunds* with narrow-mouthed outlets can prevent erosion of the surface soil by flood water.

(*b*) (i) There are numerous *tal* and river lands where a marked improvement has taken place through frequent floods, and the land has consequently become fertile.

(ii) In some cases the flood water brings only sand with it and the soil deteriorates.

(*c*) The Agricultural Department of the Government should undertake practical demonstration in this connection on a large scale and bear a portion of the cost involved in reclaiming those areas.

QUESTION 10.—FERTILISERS.—(*a*) Natural manures are freely used by the cultivator, as they are very cheap and easy to get. Dung, tank mud, slaughter-house refuse and soot have proved their manurial value and their use should be popularised. The use of tank mud improves sandy soils. A large quantity of blood can be gathered from the slaughter-houses of towns and cities and blood mixed with ashes and preserved in pits will make a rich manure. Soot contains two or three per cent of nitrogen and can be used as a top dressing for wheat to prevent the attacks of grubs. It can also be used for this purpose on onions. Artificial fertilisers are expensive and unless they are economically manufactured in India it will not be possible to introduce them on a large scale. I would suggest that fertilisers such as gypsum, phosphates and sulphur, which are in great use in the Province, should be supplied to the cultivator through the agency of co-operative societies. Propaganda work should be undertaken to popularise artificial manures and put the supply on a commercial basis.

(*b*) Some legislation on the analogy of the Fertilisers and Feeding Stuffs Act in England should be undertaken to protect the agriculturists against fraud.

(*c*) Depots should be opened at which artificial manures could be bought in sealed bags and at prices comparing favourably with those of agricultural products.

(*d*) There has been so much demand for gypsum in Bihar that it is no longer possible for the Agricultural Department to arrange for supplies for the individual users.

(*e*) Sufficient investigation has not been made into these and I would suggest that their manurial value should be properly investigated and tested.

(*f*) The agricultural associations should explain to the cultivators the manurial value of cowdung and should purchase from them all cowdung.

QUESTION 11.—CROPS.—(*a*) (i) The existing crops can be better improved by acquainting the cultivator with the methods of proper digging, manuring and irrigation and the selection of seed, the system of hybridisation and introduction of foreign varieties.

(ii) It is very essential that a regular supply of fodder should be maintained for the cattle. The system of silage pits should be introduced. In catering for a large herd of cattle the making of silage has a distinct advantage. Rough grass, clover and maize can be made into useful silage.

(iii) I would suggest the formation of small village societies under the control of the Co-operative or Agricultural Department for the supply and distribution of pure seeds.

Moulvi Saiyid Muhammad Ahsan Khan.

(iv) The loss by wild animals is so manifest upon many farms that if some form of protection were not afforded profitable farming would become impossible. Farms should be protected by fencing. In cases where extensive damage is done by jackals and wild pigs, the provision of the Arms Act should be liberally applied so far as cultivators are concerned and licenses for guns should be granted to them.

(*b*) I would suggest that more attention should be paid to crops like potatoes, oats, barley and peas.

(*c*) There is great scope for the cultivation of sugarcane, tobacco, oilseeds, ginger, chillies, betel, vine, groundnut and garden and fruit crops, and attempts should be made to grow them extensively.

QUESTION 12.—CULTIVATION.—(i) The process of tillage is very important in connection with the proper growth of the plant and there are certain operations which require the use of modern implements if improvement is desired.

(ii) The varied and extended rotations now practised in European countries should be tried here. It should be the effort of the Agricultural Department to determine the order of cropping on the basis of varying conditions of climate and soil. The system of rotation has proved its advantage in European countries in increased productivity of crops and economy and convenience of labour, and the value of these advantages should be tested on Indian farms.

QUESTION 13.—CROP PROTECTION, INTERNAL AND EXTERNAL.—(i) The problem has not been properly tackled and the Indian cultivator knows nothing about it. The results obtained in the laboratory as to diseases of crops have not yet seen the light of day. Plant pathology is a comparatively modern study and the necessary knowledge has yet to be gained. Some causes are directly traceable to environment and are largely due to unhealthy conditions arising from the soil. Efforts should be made to check them.

(ii) Important diseases, such as those of cereals, potatoes and sugarcane should be investigated and the results obtained should be communicated to the agriculturist by the Agricultural Department. For control and prevention of these diseases it would be necessary to make a survey of the life histories of insect pests.

QUESTION 14.—IMPLEMENTS.—(*a*) The thirty millions of inefficient wooden ploughs now in use should be replaced by suitable standardised iron ploughs, the result of which would be that the ploughing work could be done in half the time. Several operations connected with cultivation require specialised modern implements but in India the same implement is used for various operations, which leads to inefficiency. The iron ploughs recently manufactured by some English engineering firms are almost perfect, particularly the *Sabul*, which is one of the best designed ploughs for India. Similar ploughs are now being designed in India itself and I would recommend their use to the cultivator. Modern implements for sowing and harvesting, worked by bullocks, have also been introduced and they could be safely used by the cultivator.

(*b*) The Agricultural Department of the Government should demonstrate the use of these modern implements to the cultivator and small loans may be advanced by co-operative societies to the cultivators for the purchase of these implements.

(*c*) There seems to be no difficulty in the manufacture of agricultural implements. The Agricultural Department should get a number of these implements from manufacturing firms and then send them on to

the agricultural associations or co-operative societies for both demonstration and sale; they can be placed on view and the cultivator can easily purchase them through his agricultural association or village co-operative society.

QUESTION 15.—VETERINARY.—(*a*) To place the Civil Veterinary Department under the Director of Agriculture seems to be more practical and it would lead to better supervision.

(*b*) (i) The dispensaries are at present under the control of district boards. I am inclined to think that proper supervision over Veterinary Assistants is not exercised by the district boards and, therefore, I would suggest that they should be controlled by the Deputy Director of Veterinary and the Inspector of the range in which they are located.

(ii) No. There is great need and demand for more Veterinary Assistants but owing to lack of funds the district boards cannot afford to employ more staff.

(iii) Yes. I favour the transfer of control to provincial authority.

(*c*) (i) The agriculturists are not making full use of the dispensaries. This is mainly due to their ignorance and conservatism and to the sanctity and respect which the Hindu cultivators attach to certain animals. They do not allow the Veterinary Assistant even to touch them. This resistance could be overcome with the assistance of educated and influential persons of the locality and by demonstrating to them the efficacy of inoculation for preventing the spread of epidemics.

(ii) The touring staff is not sufficient and there is need for its increase.

(*d*) Legislation on the lines of the Diseases of Animals Act in England should be undertaken to prevent the spread of contagious diseases among animals, and to provide for their suppression.

(*e*) There is no difficulty, but in the interior when the supply is exhausted it takes a very long time to get a fresh supply, with the result that cases cannot be dealt with promptly. A sufficient supply should be maintained in the sub-divisions.

(*f*) Because of the prejudice among the Hindus against shedding even a few drops of blood of the sacred animal in the process of inoculation. But this prejudice is slowly dying out, as the educated Pundits have pronounced in favour of inoculation, which in their opinion would help to save life.

No fee is charged for inoculation.

(*g*) Further facilities are desirable and for this purpose the superior staff for research should be increased.

(ii) I would recommend the extension of provincial veterinary research institutions.

(*h*) (ii) Special investigations should be conducted by research officers in the Provinces.

(i) I am in favour of the appointment of a superior veterinary officer with the Government of India. Great advantage would result from such an appointment, as there would be co-ordination of the work done in the Provinces. The superior officer might investigate problems connected with research which cannot be studied in the Provinces and there would be control over provincial veterinary departments.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i) The importance of cattle breeding can be well gauged from the fact that there are more than twenty-one million cattle in the Province and it is a question with which agricultural prosperity is very closely associated. The chief

object should be to produce dual purpose animals so as to combine draught and milk qualities. The Montgomery herd maintained at Pusa has been a great success and the milking capacity of the cows has greatly increased. Similar efforts should be made in the Provinces to create good milking breeds by careful selection. Cross-breeding should also be tried by getting good pedigree bulls from the Punjab and Multan. Work in this connection should be carried out on a larger scale and more staff should be recruited by the Government for the supervision of cattle breeding.

(ii) Milk supply societies should be started on a co-operative basis and attempts should be made to manufacture butter, cheese, *ghi* and curd by improved methods.

(iii) To educate the farmers in better methods of feeding and handling dairy herds, better methods of handling the milk and skill in manufacturing dairy products, dairy schools should be started. An effective beginning should be made in this direction and expert staff should be appointed for the purpose.

(*b*) (i) Overstocking is one of the greatest mistakes which a farmer can make. A farm will give the best return when it is carrying a stock under, rather than over, its full complement. Overstocking also leads to inadequate and improper feeding.

(*ii*) Owing to the absence of enclosed pasture lands the cattle feed on things other than grass, which may be unnutritious and injurious.

(iii) Grass and *juar* stalks are the chief cattle fodder in India. For bullocks in hard work, *bhusa* made of crushed wheat straw and the leaves and tender stems of leguminous crops are given. Sufficient dry fodder, particularly *bhusa*, should be stored, for use whenever required.

(iv) The ensilage system should be adopted on a large scale; green fodder should be preserved in pits or silos for use in dry seasons.

(v) Mineral ingredients are of importance in the formation of bone and their absence in fodder and feeding stuffs tends to make the cattle unhealthy and weak. It is important therefore that the cattle should be fed upon a carefully selected ration.

(*c*) When the maize crop fails owing to insufficient rainfall, it occurs during the period from July to December. Soon after this period green fodder is available and within two or three weeks young growing cattle begin to thrive.

(*d*) I would suggest that in the villages land should be reserved for growing fodder crops and a regular supply maintained. The work could be easily undertaken by the local agricultural association with the advice of the Agricultural Department. Fodder could then be made available to the cultivator whenever required, at a reasonable price.

(*e*) This could be done by propaganda work to be undertaken by the Agricultural Department by demonstrating the system of ensilage. The co-operative societies should also advance small loans for this purpose.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) I have worked out figures and have estimated that an average cultivator works about seventy-five days in the year on one *bigha* of land under mixed crops. In the slack season he is generally unoccupied.

(*b*) Rural co-operation would prove of marked service to agriculture. By co-operative methods the agriculturist can easily be encouraged to take up subsidiary industries. Cottage industries have already been organised by the Industries Department of the Government and some

of the cultivators are now being employed in these industries during the slack season. I would suggest the starting of co-operative dairies and fruit growing.

(*c*) There might be objection by Hindus to poultry rearing on religious grounds, but there is no obstacle in the way of the expansion of other industries.

(*d*) I think Government should do more to establish industries such as oil pressing, sugar making, cotton ginning and rice hulling, for which there is great scope in the Province.

(*e*) I think it would. For instance, if rice-hulling mills and oil-pressing machines are established in rural areas it would be easy to find subsidiary employment for the cultivator.

(*f*) Yes.

(*g*) I think the starting of small companies, on a co-operative basis, for manufacturing and repairing agricultural implements in the rural areas would lead to greater rural employment.

(*h*) Small health societies should be formed in the villages and the Public Health Department of the Government should carry on an extensive propaganda by means of cinema shows and bulletins in the vernacular with a view to impressing upon the people the need to improve the health conditions of their environment.

QUESTION 18.—AGRICULTURAL LABOUR.—(*a*) (i) The only way to attract agricultural labour would be to offer better wages. I would suggest that the wages of the agricultural labourer should be systematised. At present the wages of the farm labour differ greatly in different parts of the country. The time-honoured *kamai* or farmer-ploughman system by which the farm labourer had a settled life, used to live on the farm land rent-free and was provided with food and clothing by the landlord, is slowly dying out. This was the best system and attempts should be made to revive it. There is shortage of agricultural labour in the Patna district.

(ii) If land were let out to the labourer on small rent and attractive wages offered to him it would be easy to attract him. Labour colonies should be opened for the reception of a large number of men to work on the farms; they should be allowed to live rent-free on the land, and other privileges should also be allowed.

(*b*) Large numbers of labourers at present are attracted to industrial areas, such as Jamshedpur, Calcutta and the coal fields of Jharia. A time may shortly come when rural depopulation may become intense and only a few old men be left as workers on the land. If labour colonies are started labour may also be requisitioned by different areas at times of shortage and emergency.

(*c*) As I have suggested above, the starting of labour colonies would help to develop the areas. The labour colonies have afforded examples of agricultural improvement in Germany and the system may also be adopted in India.

QUESTION 19.—FORESTS.—(*a*) Grazing facilities are freely granted by the Forest Department. Fifty-seven per cent of the reserved forests and seventy-six per cent of the protected forests are open to kine, according to the official report. Ryots are also given facilities for cutting fodder, but they seldom avail themselves of this privilege, with the result that a considerable quantity of fodder is wasted annually.

(*b*) The agricultural associations can easily obtain increased supplies of firewood and fodder from the Forest Department and distribute them to the agriculturists.

Moulvi Saiyid Muhammad Ahsan Khan.

(*c*) The economic and climatic utility of the forest can hardly be exaggerated. In Chota Nagpur, which is a plateau, the deterioration of forests has led to erosion in the uplands and to serious floods in the plains of Orissa. The only remedy lies in judicious preservation of the forests.

(*d*) By the increased protection of forests on the Chota Nagpur plateau great benefit would result to agriculture. It would both prevent serious floods in Orissa by holding up the moisture and supply water for irrigation purposes. Water supplies can be drawn from the catchment areas and also by erecting masonry reservoirs on suitable undulating hilly tracts. Rain water would be locked in these reservoirs and the supply could also be supplemented by means of pumps in time of emergency. There would be a key to the reservoirs to feed the canals. If the canals were further joined to a river or tank the water supply could be increased and it would be possible to irrigate large areas in the plains. This method would also prevent erosion.

(*e*) There is scope for a scheme of afforestation in Rajgir (Bihar sub-division). On the hilly tracts of Rajgir, reservoirs can be erected and use can also be made of natural springs in feeding canals for irrigation purposes. The canals may be made to join the Ganges and water can be taken into the villages in the interior.

(*f*) In this Province forests are not suffering from excessive grazing.

QUESTION 20.—MARKETING —(*a*) They are not satisfactory or adequate. More facilities should be offered for the disposal of agricultural produce to better advantage and for the supply of good seeds, pure fertilisers and other requisites to the cultivator, at moderate prices.

(*b*) It is not satisfactory. All land produce, particularly rice and paddy, should be controlled by village associations and societies which should arrange for the disposal of the produce. At present what happens is that the middlemen dupe the farmer and extort very heavy commission and, in most cases, the *mahajan* buys the produce at a nominal price which he has probably advanced to the farmer before the harvest time. Village societies should replace the middlemen. The sale of produce is a difficult form of agricultural co-operation and the village societies should acquaint themselves with modern business methods. A trading federation of agricultural societies should also be formed for the purpose.

(*c*) (i) All agricultural produce collected by village associations should be properly graded according to quality and then carefully packed in sealed gunny bags.

(ii) This might also apply in the case of export markets.

(*d*) Yes. I am in favour of acquiring more information about these matters.

QUESTION 21.—TARIFFS AND SEA FREIGHTS.—I consider that duties, both import and export, and sea freights are rather high and consequently they adversely affect the prosperity of the Indian cultivator to some extent. I would suggest that freights and duties on agricultural implements imported from foreign countries should be reduced, as also export duties and freights on agricultural produce.

QUESTION 22.—CO-OPERATION.—(*a*) (i) Co-operation has great potentialities of usefulness to the agriculturist. Government should give greater subsidies for the promotion of co-operative societies and should also give loans to co-operative banks, free of interest, for agricultural purposes.

(ii) Big landlords and bankers should be persuaded to deposit their money in co-operative banks.

(*b*)*(i) Credit societies should advance loans at a lower rate of interest than at present. Some of the credit societies are not working satisfactorily owing to lack of supervision.

(ii) Such societies are very few in this Province and their number should be increased.

(iii) A few societies started in this Province for the purpose have been mismanaged and efforts should be made to establish such societies on right lines. Proper control should be exercised over them by the Co-operative Department and responsible persons should be persuaded to join them.

(iv) Such societies are not in existence in the Province. But there is need for such societies in rural areas.

(v) The salvation of the smallholders in India lies in co-operative effort, as has been the case in European countries. Such societies would be very useful and attempts should be made to start them soon.

(vi) The means at the disposal of the cultivator do not allow him to purchase modern implements and if such societies are formed it would be a great help to the agriculturist and would lead to a greater outturn of crops. These societies should only charge a nominal rent for the use of these implements.

(vii) This will be an ideal thing for this country and I favour the formation of such societies.

(viii) I would favour the formation of these societies.

(ix) I would suggest the founding of a co-operative insurance company or society for agricultural live and dead stock.

(*c*) I would favour legislation for the purpose.

(*d*) I think they have achieved their object to a great extent during the last twenty years and more should be done by extending the organisation on right lines.

QUESTION 23.—GENERAL EDUCATION.—(*a*) (i) So far, university or collegiate education has aroused very little interest in rural economy. I would suggest that a degree course in agricultural science and rural economy should be instituted by the Indian universities.

(ii) In secondary or middle schools a thorough grounding should be given in the fundamental sciences (botany, physics and chemistry) and the study of the application of these subjects to agriculture should be encouraged.

(iii) In elementary schools instruction in nature study and rural object lessons should be made compulsory. Small gardens and farms should also be attached to elementary schools. This will all tend to arouse interest in the young men in agriculture, which would be of great advantage.

(*b*) (i) Much depends upon getting the right sort of teacher, a man well versed in practical agriculture and who can impress upon the young men the dignity of manual labour. In this connection I would suggest that the system of itinerant instructors in agriculture prevalent in European countries be adopted here. This is to be regarded as the pioneer work of the whole system of agricultural education. According to this scheme the instructors will deliver lectures in different rural areas, carry out experiments, advise farmers by visits, assist

in the checking of fraud in the sale of seeds and manures and adjudicate in the farm prize competitions to be held. This system, if introduced in India, will enable the young farmer to obtain a thoroughly sound agricultural education.

(ii) There are some difficulties in imposing compulsion and, in areas where education has been made compulsory in the Province, only partial success has been achieved. But I think an organised attempt should be made in this direction.

(iii) The main reason is that the boys of the agricultural classes are kept at home to assist their parents in cultivation. They are not allowed by their parents to attend school.

QUESTION 24.—ATTRACTING CAPITAL.—(*a*) It should be brought home to big men of capital and enterprise that there is stability in farming capital. It is always realisable and may be looked upon as safe. The Indian nature cares more for position and honour and, if honorary posts of Assistant Directors of Agriculture are created and titles are conferred upon big capitalists, they are likely to be induced to take to agriculture. Efforts should be made by the Government to form an All-India agricultural association with the object of undertaking agricultural ventures and creating a fund for the purpose. Big men with capital can be easily influenced by the Government to join the association.

(*b*) To them agriculture does not seem to be so profitable and they prefer to invest money in other commercial and trade ventures. They seem to be under the impression that the return from agriculture is not commensurate with the amount of capital and labour involved in it.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*a*) The Indian cultivator still lives in his cottage or thatched, ill-ventilated house. He should be persuaded to keep his house well ventilated. Small village health societies should be formed to look after the health of people in the rural areas and to provide a pure supply of water. For this purpose the district boards should help these societies in sinking wells.

(*b*) I am in favour of conducting economic surveys. Such surveys can easily be conducted through the assistance of village societies. If such surveys were conducted by the Government directly, there would be difficulty in collecting correct data and information on the subject, as the agriculturist might conceive that the surveys were made for the purpose of taxing him, and he would naturally be averse to giving any helpful information and would conceal facts. The enquiry should also be directed to ascertain how far it would be possible to improve the economic condition of the agriculturist.

(*c*) So far as I have enquired into the matter, I think that the lot of the agriculturist is not so bad as it is supposed to be. The system of commutation of produce rents to cash has greatly improved the economic condition of the agriculturist, particularly in South Bihar. Under Section 40 of the Bengal Tenancy Act, any ryot may apply to the Collector for the commutation of a produce to a cash rent and in many cases commutation has been granted. The result of this is that out of the half-produce share which used to go to the landlord only a nominal cash rent fixed by the Court is now given to the landlord by the cultivator and the entire produce is held by the cultivator himself. The rise in the price of grain has also, to a great extent, increased his prosperity.

QUESTION 26.—STATISTICS.—(*a*) (i) The best method for India would be to obtain detailed returns from the occupiers through the village societies in connection with the census of population, and, year by

year, to ascertain, after enquiry from the village societies, the increase or decrease of the acreage under each crop. The Indian cultivator is so ignorant and conservative that any other system would not work successfully.

(ii) The same method as I have suggested above may be applied in this case as well.

(iii) I would suggest the same method.

(iv) This could be ascertained by means of settlement records and the census returns of the population

(v) A regular system of annual agricultural returns should be instituted. The agency of agricultural associations in the districts and sub-divisions should be utilised by the Government in obtaining necessary information and facts in this connection.

(*b*) I have no other suggestions to make than those I have already enumerated.

Oral Evidence.

68,191. *The Chairman*: Mr. Ahsan Khan, you are Secretary of the Barh Agricultural Association, Barh, District Patna?—Yes.

68,192. In answer to Question 1 (*a*) (i) you say: "Custom farming has made great strides in the United States of America". Would you tell us what "custom farming" is? By "custom farming" I mean that organised and extensive efforts should be made on a co-operative basis in order to bring the advantages of scientific agriculture within the reach of the agriculturists, and for this purpose to have agricultural machinery and up-to-date implements and allow the cultivators to use them by paying a nominal rent.

68,193. I observe, from your answer to Question 2, that you are of opinion that an agricultural college would be useful to this Province?—Yes.

68,194. Do you regret that the Sabour College was closed?—Yes.

68,195. **You think it was a pity?—Yes.**

68,196. In your answer to Question 16 (*b*) (iv), you advocate the use of the silo as a means of preserving fodder; do you know of any cultivators who use the silo to preserve fodder?—The agriculturists are not familiar with this method in my part of the Province and unless the Agricultural Department take the initiative in the matter by demonstrating the usefulness of the method, the agriculturists will not adopt it.

68,197. All over India we have been told that silage is most excellent cattle food, but nowhere in India have we discovered the cultivator using it?—The reason is that the cultivator does not know how to use it, as I have indicated above.

68,198. In your answer to Question 18 (*a*) (i), you talk about the time-honoured *kamai*, or farmer-ploughman system by which the farm labourer had a settled life and used to live on the farm land rent-free and was provided with food and clothing by the landlord, and you regret that that system is slowly dying out. Was the labourer attached to the soil in those old days? Was he allowed to go away if he wanted to?—Yes; he was allowed to go away when he had paid back the money.

68,199. Were many of them in a position to give back the money and go away, or was it in fact a system of serfdom?—They were in a position to go away and many of them did go away after returning the money. The system was voluntary and it did not mean serfdom.

68,200. As a rule, you think they could have gone away if they wished to?—Yes.

68,201. Where do you suggest they could get the money from?—From those men whom they served. It was open to them to contract with other parties paying higher wages and thereby they could get money to pay back.

68,202. I do not understand your answer?—These *kamais* could work for the cultivators, and they were paid money for their work.

68,203. *Professor Gangulee*: You say you want an agricultural organisation society in each Province?—Yes.

68,204. What prevented you from forming such an association? What were the difficulties?—We cannot get any information and assistance from the Agricultural Department or the Co-operative Department.

68,205. You think an agricultural organisation society is necessary. Why are not these associations formed? What are the difficulties?—There are associations already but they are not working.

68,206. Why?—There are no funds and no men to work them. The Agricultural Department is also not giving them any help.

68,207. You are a member of an agricultural association?—Yes I am connected with the Barh Agricultural Association as its honorary secretary.

68,208. Have you taken interest in the co-operative movement?—I know that there is the co-operative movement; but I have got no connection with it.

68,209. Have you at any time received an invitation from the Agricultural Department to attend their meetings or their demonstrations?—Not for any demonstrations; I remember having been invited by the District Agricultural Association to a meeting in 1927.

68,210. Have you visited Pusa?—Yes, once; that was ten years ago.

68,211. When the Sabour College was in existence, did you pay a visit to that college?—No.

68,212. *Sir Thomas Middleton*: You are Secretary of the Barh Agricultural Association. What is that association? What does it do?—It was meant to help agriculturists through the aid of the Agricultural Department.

68,213. How many members have you?—We have about ten members.

68,214. Do the members pay any subscription?—They do not pay anything.

68,215. Is payment voluntary?—Yes.

68,216. *Sir Henry Lawrence*: Have you any funds?—Not a single pie; the secretary has to pay for everything.

68,217. *Sir Thomas Middleton*: Have you tried to distribute pure seeds among your members?—Yes. When they place the order we get seeds from Pusa and distribute them. But such orders are not many. This year a landlord acquaintance of mine wanted fifty *maunds* of wheat; we applied for it from Pusa but we got a reply that they had not even one *maund*.

68,218. You could not get the seed?—No.

68,219. Have you done anything to improve the cattle?—Yes.

68,220. What have you done?—I have just got from the Agricultural Department a Murra bull. I got it only three or four months ago.

68,221. Have you done anything to improve the feeding of cattle?—No.

68,222. *Dr. Hyder*: You write books on agricultural subjects?—Yes.

68,223. Have you had any encouragement from the Department of Agriculture?—I have received no encouragement from the department.

68,224. You write books in popular language?—Yes.

68,225. How many books have you written?—The book is in six volumes.

68,226. You think your teaching is getting down to the cultivators?—Yes; I am trying my best to help the cultivators.

68,227. When did you write your first volume?—About seven or eight years ago. All the copies are lying in my *almirah* (about a thousand copies); there is no demand for them as most of the people do not take any interest in agriculture.

68,228. *Babu A. P. Varma*: You suggest that Government should do more to establish industries such as oil pressing, sugar making, etcetera. Do you not think that in that case there will be difficulty in getting labour for agriculture?—The labour difficulty in Bihar and Orissa especially is very great and it would then be very difficult to get labour for agriculture.

68,229. Do you want these industries only for the slack season when there will be no cultivation, or do you want them throughout the year?—I would recommend these industries for the slack season only.

68,230. You know that there is difficulty in securing labour for agricultural purposes?—Yes. I am aware of that.

68,231. Do you not think there will be more difficulty if the labourers take to these industries?—I do not think there will be any great difficulty.

68,232. *The Chairman*: I note that you have tried to protect your tenants from the depredations of wild animals?—Yes.

(*The witness withdrew.*)

Mr. S. K. ROY, M.A., Principal, Gossner High School, Ranchi.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(*a*) Research into the scientific value of the indigenous theory and traditional methods of agriculture is very urgently required. Either the soundness of the Indian ryots' cropping system should be established and justified or it must be shown whether and where it is defective. A lot of random talk about "the experience of ages" and that "the Indian ryot has nothing to learn" is indulged in, but it is well known that science has again and again revolutionised all departments of age-long human experience.

(*b*) Generally, I should like to say that scientific officers may be appointed to pay more attention than has been paid hitherto, to chemical research of all kinds connected with agriculture. The greatest benefits to agriculture have come from the chemist rather than from administrative laws or economic theories. The supply of the gaseous needs of vegetation, the prevention of decrease in humus, chemical warfare on insect pests which cause huge losses to the agriculturist every year, the production of valuable articles of human industrial use from ordinary farm products or from waste materials on the farms,

are some of the ways in which the chemist has enormously benefited agriculture and may continue to do so.

QUESTION 2.—AGRICULTURAL EDUCATION.—It is not quite clear whether the term means specialised education in agriculture or education for the agricultural population. Sections (viii), (xii) and (xiii) seem to refer to the latter, and the remaining Sections to the former. At the outset I desire to point out that, in this Province, there is neither any agricultural college nor any agricultural school, nor any faculty of agriculture in the University. Neither is any degree in agriculture or licentiate or any diploma obtainable in the Province. The only provision for any specialised or vocational teaching in agriculture is the taking in of about three apprentices in each of the Government demonstration farms.

I am strongly of opinion that agriculture should be included as a subject in a much greater degree than at present, in the general scheme of education in the country. I have given my reasons in my answer to Question 23 (*a*).

(i) and (ii) That the supply of teachers and institutions is not sufficient and that there is urgent need for extension of teaching facilities, at least in this district (Ranchi), will be apparent from the fact that in the Kanke agricultural demonstration farm, (Government) extending to three hundred acres, the department do not think it desirable to have more than three men of the Matriculate standard class under training at one time. It is a matter of arithmetic to determine how many such farms with the well paid staff that each maintains will be required in the Province to give training annually to, say, three hundred men of that class.

(iv), (v) and (vi) Attendances at existing institutions, in this Province at least, appear to be as numerous as the institutions are prepared to admit; in fact the demand for admission, I believe, exceeds the accommodation available. It is however a notorious fact that as a rule in the whole country, agricultural institutions have been mostly languishing and lads have gone into these institutions mainly for the purpose of getting Government employment, which is very limited, in the Agricultural Department. That being the motive, pupils have not been drawn as a rule from the agricultural classes, but from the intelligentsia or the *bhadralog* class.

(viii) This will be discussed under Question 23.—*General Education.*

(x) The answer to this question appears to me to be one of the central problems of agriculture in India. When agriculture begins to attract middle class youths, then the intelligentsia will be beginning to pay back their debt to agriculture. In India it is the villages which have been constantly giving of their best to the towns and have built up the middle class, so that when the middle class is again drawn to the villages then the long series of debits will begin to turn into credits.

It is not that the middle classes are not theoretically interested in agriculture. The ideal of a pastoral life appeals to many and its most fruitful evidence lies in the fact that the professional classes and business men (outside the very big commercial towns) invest their capital in agricultural land and in small or big sub-zamindaris. In those cases, where the owner does not put in his least efficient dependent to do the farming, it has only multiplied the number of absentee landlords or city non-cultivators possessing lands. It has encouraged the pernicious system of under-tenancy farming, which is not good either for the actual cultivator or for the person on whose behalf he farms.

It is obvious that middle class youths, by their superior intelligence and general education, would more readily appreciate the value of intensive cultivation, the use of manures, the advantages of mixed farming, fruit growing, etcetera, than the ordinary cultivator.

The only way in which agriculture can be made attractive to the middle class youth is by proving to him by demonstration that agriculture is a paying proposition and that young men can make a good living out of it. With a view to this I suggest that—

(1) co-operative farms on a limited liability basis be organised, with working and non-working share-holders;

(2) such farms be liberally assisted by Government with loans to the fullest extent possible compatible with the assets of the share-holders, and with expert advice;

(3) where difficulties arise with ryots who look with suspicion on all such persons, as being interlopers in their opinion, they should be removed by Government with the help of the Land Acquisition Act, if necessary. The ryots, by encroachment on lands, by cutting down trees, by declining to pay rent and in other ways, may divert the attention of members from the main business and thus handicap them a great deal at the outset of their enterprise. These ryots could be compensated by being given land elsewhere. Though there may be some hardship, it would be more than worth while incurring it for the sake of the general good.

(xii) This question has been fully dealt with in answer to Question 3.

(xiii) This question has been comprehensively treated under the head "General Education", Question 23.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—Advance in agriculture and progress of the agricultural population depend a very great deal on successful demonstration and propaganda, in respect not only of agricultural operations but of all the most important subjects connected with the life of the agricultural population. In my opinion demonstration and propaganda must be considered from a wide and general stand-point, and should be regarded as conterminous with adult education of the agricultural population; for, in order to make demonstration and propaganda successful, it is necessary to carry the conviction to the mind of the agriculturist that you are vitally interested in all his welfare and not merely in convincing him, say, that sugarcane is a paying crop or that sulphate of ammonia is a most profitable manure. Once you have carried the conviction mentioned, once you have proved that there is an organic connection between his success in agriculture and all his other welfare, you have got a grip over him which will not be easily loosened. Demonstration and propaganda will then be easy. A most satisfactory and proved way of obtaining this grip is through the village co-operative society. In this way you meet the individual as a social unit and you get at the individual unit through the body of which he is a member, and, *vice versa*, you get at the whole body, the society or the village through the individual. Demonstration convinces not one but the whole body and if successful it is not merely scientifically so but socially as well.

(*a*) The measures which have been most successful are demonstrations of the methods in question through, and with the co-operation of, co-operative societies.

(*b*) Field demonstrations can be effective only when you have got the cultivator to try the experiment, with every step of which he is familiar, side by side with his traditional methods. The comparative

method should be followed up by an intelligent exhibition of the real results. Here again the village society's co-operation is indispensable.

(*c*) I cannot suggest any methods better than those proposed by Mr. N. K. Roy, Deputy Registrar, Co-operative Societies, of this Province, in his paper* "Co-operative Organisation and Propaganda" read before the last Bihar and Orissa Co-operative Federation Congress.

(*d*) I have great pleasure in giving instances of striking success of demonstration and propaganda work along the lines mentioned above in some of the villages in the areas covered by the Khunti Central Co-operative Bank Ltd., and the Chota Nagpur Central Christian Co-operative Bank Ltd. Members of the village co-operative societies were induced to have a joint experiment on sugarcane cultivation under expert guidance. The results of the experiment were gone over in detail with the members and, as the account of every operation was entirely maintained by the societies concerned, the members became convinced at once of the profitable character of sugarcane cultivation, which is now spreading rapidly in these areas which were quite unaware of it and where the cultivators are quite conservative in their methods and inclinations. Similar success has been achieved with regard to groundnut.

QUESTION 4.—ADMINISTRATION.—(*a*) and (*b*) Generally speaking, I advocate co-ordination and co-operation between the Provinces on the scientific research side as much as possible for the sake of economy. A board of scientific advice and research may be constituted under the auspices of the Government of India. The programme of research connected with the improvement of agriculture may be drawn up at an annual meeting of this board, at which Directors of Agriculture from all the Provinces should be present. The experts maintained by the different Provinces could then be allocated work of that kind which would benefit several Provinces on the principle of division of labour and in such a way as to avoid unnecessary duplication of effort. If it be found necessary to adjust, exactly, the financial burden falling on those Provinces which would be doing All-India work at the expense of their own exchequer, then a grant may be made by the Imperial Government to the Provincial Government towards the salary of the officer so engaged.

(*c*) (i) The Agricultural and Veterinary services should be considerably increased in the lower grades.

(ii) Railways and steamers should lower freights, giving much more favourable treatment to agricultural produce and empties than they do at present.

(iii) More roads which really connect two districts should be maintained by the Public Works Department than at present, enabling district boards to take charge of more roads inside the district.

(iv) Meteorological departments should give reports on a seasonal basis rather than, as they do now, on an annual basis beginning with the calendar year. If an annual unit is found desirable the year should begin in June.

QUESTION 5.—FINANCE.—Agricultural India, both in its annual operations and its improvements in every respect, is crying out for finance. The only way in which this finance may be provided is by the development of the co-operative movement and by linking it on to the proposed All-India Reserve or State Bank. If this linking is done, it will help the development of the co-operative movement and Government can boldly undertake a definite plan of development of the co-operative movement. No joint stock banking system can reach the

* Not reprinted.

cultivator, except through the *mahajan*, unless it is linked on to the co-operative movement. If an All-India bank can lend money to a provincial co-operative bank at four per cent, the latter can lend at five-and-a-half per cent to the Central Banks and these could lend at seven or seven-and-a-half per cent to the village societies. The village societies can lend at nine-and-three-eighths per cent to the individual cultivator, which is about half the cost at which the ryot can get his money at present in this Province. One need not stress the tremendous gain that this would mean to the cultivator. If this system is not adopted, then there is no other in the field for the adequate financing of agricultural India which forms seventy-five per cent of India. The present banking system only finances a very small portion of India, namely, its trade and the capitalists of the landed class or house-property owners who finance the manufacturing industries.

What I mean by the development of the co-operative movement I have stated in my answer to Question 22 (*a*). The development of societies on the line suggested there will make the problem of financing agriculture easy. Development on this line only will make the linking up with the All-India bank satisfactory, for, in order to make the financing of agriculture by an All-India bank satisfactory and successful, the system adopted must be such as to encourage deposits from the agriculturists themselves. No measures calculated to encourage thrift and deposits should be ignored, including the larger circulation of currency notes, specially of the smaller denominations. I am, therefore, in favour of the re-introduction of one-rupee currency notes, recommended by the Currency Commission, as one which is in the interest of the agriculturists, though I would strongly advocate the use of paper of a much more superior kind. This is necessary on account of the habits of the people of India.

The plan of whole-village organisation of co-operative societies tries to get the solvent and morally superior classes of the village into the society rather than the idle and needy. In this way the interest and sympathy of the better elements are enlisted in the good cause. This ensures the following three advantages from the financial standpoint.—

(*a*) These elements are thrifty and their deposits will serve to strengthen the financial position of the societies, which in turn will strengthen that of the Central Bank and so on to the All-India bank.

(*b*) These elements are more responsive to demonstration and propaganda. We have not only to provide the finance to the cultivator, we have also to educate and train him to make good use of the finance by promoting better production, better health, etcetera, all round. These elements are those that must be used to lift up the rest.

(*c*) These are the very elements that would appreciate at once the meaning of credit. They do not now use their credit; being out of debt they are of opinion that it is best not to get indebted to anyone; but a little instruction opens their eyes to the tremendous advantage of using their credit position, often their locked-up capital, to their own advancement. When these classes learn and practise, it is easy to teach the others.

Short and long term credits.—The usual term of credit in a village society, as is well known, is five years, and consequently everything is done on the five-year basis, from the individual's loan from his village society to the Central Bank's loan from the Provincial Bank, but a much shorter term of credit is necessary and sufficient for co-operative

marketing, and a much longer term for debt redemption, land mortgage or land improvement. Long term credits are risky and unprofitable in the case of marketing, while, without a long term credit of at least ten years, debt redemption or land improvement is impossible.

QUESTION 6.—AGRICULTURAL INDEBTEDNESS.—(*a*) The main causes of borrowing are such unproductive expenses as marriage, *sradhs*, etcetera. The only source of credit for the cultivator, where he is not a member of a co-operative society, is the village *mahajan* or the itinerant moneylender—the Kabuli or the Naga. The reason preventing repayment is that having spent the borrowed money on unproductive expenditure, the cultivator is unable to repay his debt, because of the small margin he has above his means of livelihood.

(*b*) A co-operative society is quite adequate and sufficient for the purpose of redeeming the agriculturist from debts of all kinds except those for which his land is mortgaged.

The measure specially necessary to deal with mortgaged land is the establishment of a land mortgage bank.

It is possible for the Central Co-operative Bank and the village co-operative society to undertake redemption of land mortgage, if the bye-laws of co-operative societies and the Act could be modified to enable the Central Co-operative Bank to deal with this question in conjunction with the village society. If this could be done it would be ideal. For one reason, however, it would perhaps be more advantageous to have a central land mortgage department of the Provincial Bank, dealing directly with the village societies in the matter of land mortgages, and under the provisions of a special land mortgage bank Act. Special evils sometimes need special legislation or organisation so that those evils may be overcome. Moreover, the terms on which land mortgage loans are to be advanced are so different from the ordinary work of a village society that a special institution appears to be called for.

A usurious loans Act should form a part of the normal legislation of every country.

Limitation of the right of mortgage and sale does more harm than good. Non-terminable mortgages should be prohibited. This question of the limitation of the right of mortgage and sale and of non-terminable mortgages is of special importance to Chota Nagpur. I have noted with regret that these limitations have done untold harm to the people of Chota Nagpur. By law the people of Chota Nagpur are prevented from selling their lands. Hitherto this prohibition was absolute, but lately a modification has been made, which lays down that the land may be sold only to a person of the same race or caste with the consent of the landlord. This has not prevented alienation of land either by the outright sale in former days, or the alienation to people of other race or caste at the present time. The only effect of the law was, or has been, that when outright sale was prohibited mortgages were made which were virtually sales. Where sale is to be made to people of the same race or caste, dummies have been put forward in whose name the buying has been done, the real purchaser being a mortgagee of the land from the dummy. The result of these restrictions has been incalculable loss to the people who have had to alienate their lands in this round about way at much less value, because the restrictions of the field of purchasers and the consent required from the landlord serve only to lower the value of the land of the seller.

I urge strongly the repeal of these restrictive laws.

QUESTION 7.—FRAGMENTATION OF HOLIDINGS.—Generally I would suggest that consolidation be attempted by means of co-operative societies. The attempt, however, is not likely to succeed if the societies are not organised on the " whole-village " plan referred to in my answer to Question 22.

QUESTION 8.—IRRIGATION.—(*a*) (ii) I strongly advocate the adoption of new irrigation schemes by tanks or high level *bunds* or embankments along sides of streams and rivulets throughout Chota Nagpur. There is a great possibility of bringing into cultivation thousands of acres of lands which would be some of the best lands in the district. This statement is not a mere counsel of perfection or a theory, but it is a possibility that has been actually proved. I do not think it will cost Government more than three or four per cent on the capital necessary for carrying out a definite programme of such irrigation in this district. Immediately such a bund is made the lands that are prepared are taken up eagerly by farmers, who readily pay the *salami* to get ryoti right over it. This brings back the capital with a gross return of fifty per cent above the capital spent.

The problem of extension is quite easy with regard to *khas mahal* lands, but where the lands are sub-tenures from a superior landlord, the right of resumption which the latter possesses has a great deterrent effect in the improvement of lands in this way. The law regarding resumption by the superior landlord needs amendment.

A special irrigation section of the Agricultural Department (for Chota Nagpur especially) seems to be called for. No very highly paid head of department is necessary, nor should any heavy overhead charges be incurred. There are officers in the Agricultural Department with the necessary experience of such projects who could easily take charge of the job.

Perhaps illustrations of successful irrigation and reclamation of lands may be of considerable interest here. In the district of Ranchi, in the villages of Kochebong and Hessel, both *khas mahal* properties, two hundred acres and sixty acres of land, respectively, have been brought under cultivation and are being irrigated by these high level or Kanke *bunds* (so called because they were first attempted at the Government demonstration farm in Kanke). The cost of these reclamations and *bunds* was Rs. 2,300 and Rs. 700 respectively. Three to four times the money could have been received back in the shape of *salamis* from ryots who took settlement of the lands. If zamindars did this with or without aid from Government, both they and Government would have got a handsome return for their money.

QUESTION 10.—FERTILISERS.—(*a*) Much greater use may be made both of natural manures and artificial fertilisers. The directions in which improvement is possible are that cultivators need to be convinced that the outlay on the artificial fertilisers is amply repaid by the outturn, and that natural manures should be conserved in a much greater degree than is done at present.

(*b*) The only way to prevent fraudulent adulteration of fertilisers is to sell the manures to the cultivators through the Central Co-operative Banks and through the co-operative societies in the villages. The manufacturers' agents should supply the fertilisers to Central Banks on agency terms in sealed bags and the latter should supply the village societies.

(*c*) The only way to popularise fertilisers is to carry out demonstration and propaganda on lines suggested under those heads, (see Question 3). Without getting villagers to take an active interest in

the demonstrations it is impossible to make them understand, approve, or adopt new methods.

(*d*) A considerable increase in the use of manures has taken place in the area covered by the Khunti Central Bank, the method mentioned above having been adopted in that area.

(*e*) No.

(*f*) To get villagers to plant more trees of the quick growing type such as *sal*, *bakain*, *siris* for fuel; to encourage them to collect fallen leaves and use them as fuel (this is practised on a fairly large scale in Chota Nagpur); to bring coal within the reach of the villages, wherever possible.

QUESTION 11.—CROPS.—Improvement in existing crops and the introduction of new paying crops, including fodder crops, depend upon an efficient organisation for the distribution of selected seeds and for maintaining the quality of the strain of seeds. This organisation must be supplemented by demcnstration and propaganda on lines already suggested. At present there is no organisation for seed distribution. This is a matter in which the Agricultural Department should work in close co-operation with the Co-operative Department. The maintenance of the supply should be in charge of the Agricultural Department; the distribution, demonstration and propaganda should be done with the aid of the Co-operative Department.

QUESTION 16.—ANIMAL HUSBANDRY.—The only way to improve animal husbandry is to promote co-operatively, (1) the breeding of cattle, (2) the cultivation of fodder supply by demonstration and propaganda about its paying nature, (3) the marketing of the fodder produced, and (4) the establishing of model dairy and poultry mixed farms near large towns where there is a constant demand for milk and eggs. Railways must reduce the freight on fodder crops.

Demonstration and propaganda on lines already mentioned are absolutely necessary.

Co-operative marketing is of great importance. (See answer to Question 20).

QUESTION 19.—FORESTS.—Indiscriminate destruction of forests in Chota Nagpur has been going on for some time. This is due to the fact that the respective rights of zamindars and ryots are not clearly defined. Though the forests belong to the zamindars, the law has given the ryots the right to cut down trees for fuel and building purposes. There is no way of preventing the ryots from cutting more than their actual requirements for it is impossible for the zamindar to police his forests adequately against his ryots, who are all of one mind in the matter. When caught, the ryot puts forward the plea that he had cut it for his own or his neighbour's use. There is thus a race between the zamindar and his ryots as to who can cut away the trees faster. Thus, in Chota Nagpur, where every village has a neighbouring jungle or forest, the ryot actually takes away in fuel and timber far more than he pays in rent.

I suggest that the law should be amended: (1) to give the ryot the right to all trees on his own land, (2) to give the zamindar the right to all trees in *gairmajuras* and *bakasht* lands, (3) to prevent trees above three inches in width being cut down in forests, or from areas definitely planted by the zamindar, without the permission of the zamindar.

QUESTION 20.—MARKETING.—My answer to the whole series of questions under this head it will be best to give in one paragraph. It is

well-known that the problem of marketing is to eliminate as much of the middlemen's profits as possible, *i.e.*, to give the producer and the consumer the fullest benefit possible by giving to the former a good return for his labour and capital and to the consumer the article of consumption at the lowest price possible. But the problem is not so simple as merely to avoid the 140 to 180 per cent that has been shown in some places to have escaped between the producer and the consumer. The problem is also concerned with stabilisation of prices throughout the year, at some periods of which the demand is greater while at others the supply runs short. The evils of individual and competitive marketing, of "cornering", "holding up" and such practices, must also be minimised as much as possible.

The nearest, in my judgment, that we can come to solving the marketing problem of the farmers is through the development of organised marketing which will enable them to sell a substantial part of their output collectively. This organisation, in my humble opinion, would be a marketing federation of village co-operative societies directly controlled by the State or by a specially created central co-operative marketing board in intimate touch, or relationship with, the Co-operative Federation or the Provincial Bank or both. I want to eliminate the Central Bank on the ground that the "middleman" should be avoided as much as possible. Long-term credit is not required in India for co-operative marketing.

The Reserve Bank could lend money at four or five per cent to the central co-operative marketing or sales board or society (whatever may be the name). This agency should lend to pools in the different sections of the Province at six or seven per cent. The two per cent profit would be the sinking fund for the overhead expenses and for emergency or reserve purposes. The central agency, managed by competent leaders, should study domestic and world markets, seasonal demands, etcetera. It would supply information and management for its organisation, just as a central office of any large business would do. It must also train its sub-managers. The organisation must be in competent business hands and must be connected with similar organisations in other Provinces, the central with centrals: the pools with pools. In fact it would be useless to start such an organisation only in one Province.

Pools ought to be organised around the chief commodities the marketing of which is at present in individual hands. Thus there would be a jute pool, a rice pool, a wheat pool, and so on. Each of these commodities has its own problems. By purchasing a sufficient amount of the total production of any commodity each year, the central co-operative association would be able to stabilise prices and give all the benefit to the producer.

If this were done, it would not be necessary to instruct the cultivator in all that highly technical and specialised information which is mentioned in the last section of Question 20. There are many more urgent things in which the villager needs instruction.

QUESTION 22.—CO-OPERATION.—The answer to (*b*) (iii) has been given above in answer to Question 20.

Suggestions regarding joint farming, *b*(vii), have been made in answer to Question 2(x). Such joint farming is more desirable for attracting middle class young men to farming than for the ordinary farmer. I strongly urge again greater help from Government to co-operative farms, on the ground (1) that it is worth while to spend

State revenues in order to attract middle class young men to agriculture, (2) that as it is impossible, from considerations of expenditure, to run a large number of demonstration farms on business lines directly from State funds, so it is desirable that where some educated men of the middle classes are interested to such an extent as to invest their money by taking shares in a co-operative farm, every encouragement should be given.

The land mortgage banks advocated in answer to Question 6 would be the best organisation for effecting large improvements on land. Minor improvements, such as construction of walls, fences, or planting of hedges should be left to the individual who should take the help of his village society if necessary. Training is required in the use of credit for these purposes other than paying off a debt or incurring some large unproductive expenditure.

I give below a number of practical suggestions with regard to co-operation which, in my opinion, would be valuable for the advancement of agriculture I trust that this method will suit better than giving replies to specific questions:—

Co-operative organisation should aim at organising a whole village into a co-operative society, embracing by far the greater majority of the members of a village, and including the debt-free, the more intelligent and literate classes who are the natural leaders in the village, instead of merely the indebted classes, who join a society chiefly for the purpose of paying off a debt bearing a heavy rate of interest which they are unable to pay off.

A whole-village organised society would have very great advantages over the ordinary societies. (*a*) It would get the support of the more intelligent members of the village and the village would therefore be more amenable to demonstration and propaganda through them.

(*b*) These members, who would themselves be responsive to higher moral and educational ideals, would exercise a great moral influence over the others.

(*c*) These members would more quickly learn to take loans for productive purposes and would therefore teach other members the value of utilising credit for improvement and other advantages.

(*d*) These members are likely to make deposits in their village societies; this would at once strengthen the financial position of agricultural India and, indirectly, of the whole country through the Provincial Banks, if the latter are linked on to the Reserve Bank.

(*e*) Special societies in villages will not be needed, *e.g.*, those mentioned in Question 22 (*b*) (i) (*ii*) (*v*) (vi) (*viii*) and (ix), for these whole-village organisations would be eminently suitable for these purposes, for some of which, such as aggregation of fragmented holdings, minor improvements, village health or sanitary welfare, co-operative use of machinery, no better organisation could be devised.

I strongly advocate legislation giving special recognition to such societies and making such organisations where they are formed co-extensive in powers with the village union.

What Government should do to advance the cause of co-operation.—1. Recognise by law, in a special manner, the whole-village society and give it all the powers and privileges of the village union.

2. Either directly take in hand organisation and propaganda on a large scale or aid liberally the efforts of Central Banks and any

voluntary non-official organisation that may exist or be constituted, or that may undertake the work of organisation and propaganda. Such organisations (*e.g.*, the Bengal Co-operative Organisation Society or the Bihar and Orissa Co-operative Federation) should be recognised by an amendment in the Co-operative Societies Act and by rules made under the Act. The organisation should be regarded as related to the societies contractually and it should have judicial powers in certain cases which it could enforce.

3. All audit expenses should be undertaken and controlled by Government.

4. Government should maintain a training institution for workers in connection with co-operative societies, *e.g.*, managers, supervisers of Central Co-operative Banks, inspecting and guarantee union clerks of societies, organisers, honorary or paid, village school teachers after they have completed their teacher training. These are the people who must be the reconstructors of village life and suitable training given to such workers is of paramount importance. Besides training in the work of organising, supervising and such other works connected with societies, teaching should be given in the principles of co-operation, the elements of agriculture, theoretical and practical, and village hygiene.

What non-official agencies should do: Specifically: There are two non-official organisations which should be closely related to the co-operative movement, namely, the district boards and the Boy Scout organisation. District boards are concerned with rural development and welfare, like Central Co-operative Banks. District boards have now full control of education in the district. Thus the advancement of the agriculturist is largely in the hands of the district boards. It is unnecessary, therefore, to dilate upon the need of district boards coming into intimate relationship with the co-operative movement.

(1) By financing and giving suitable training in co-operative work to *gurus*. How important a part the village school ought to play in moral reconstruction is dwelt upon in my answer to Question 23.

(2) The Boy Scout movement in India can have no *raison d'être* unless it is related to the village, for the village is three-quarters of India. A movement that does not touch that three-quarters cannot be a natural institution and can take no natural root in the soil. Village school masters and scout troops should be trained in such village welfare work as may be the special care of the village society.

Generally: (1) Non-officials should give more help to the Co-operative Department and its officers.

(2) They should be more loyal to the central body of their own creation.

(3) They should keep in closer touch with village life rather than merely carry out the "paper" government of village societies.

(*c*) Yes.

(*d*) My experience is that societies have generally fulfilled their objects as loan institutions, but beyond that, with a few notable exceptions, they have not attained the true object of co-operation.

Mr. S. K. Roy.

QUESTION 23.—GENERAL EDUCATION.—I desire to confine my observations under this head to two subjects, (1) the place of agricultural education in the general scheme of education and, (2) the needs of rural primary education.

(1) As to the place of agricultural education in the general scheme of education: in my opinion the possibility of agriculture as a subject of general education has been utterly ignored in India except during the last few years. This is probably because the present scheme of education was introduced into India by the British, who were a non-agricultural people and did not understand the needs of an agricultural people. Emphasis was laid on classical education and on languages. In my opinion all the science, (practical knowledge of a human being and his surroundings) and much of the geography needed for rural middle schools may be taught through agriculture. In high schools, too, the elementary science of agriculture may be substituted in the general course for classics or any other science subject without any detriment to the general cultural aspects of education. Even if non-rural classes studied agriculture as a science in a non-rural centre and carried out the practical part of a scientific education in God's laboratory, *viz.*, the fields, of not very large dimensions, they are not likely to lose culturally; on the other hand such studies are likely to react beneficially on the agricultural problem in India as a whole. As regards the general education of the rural classes (above the primary stage) it is not only not desirable but it is quite unsound, both from the large social and the pedagogic point of view, to give them education so completely divorced from their life's work as we are doing now. Ninety per cent of the boys in my school come from the agricultural classes; they live and move and have their being in land and its produce. Yet they are not being educated to it but away from it; they do not know the why and wherefore of many things with which they are familiar, while they are made to learn, by rote, of things that they have never seen and of which they have very little conception.

By teaching agriculture in schools, not only will education and life be related and connected but in an agricultural country it is of the utmost importance. I take the liberty of quoting here from the Report of the Committee appointed by the British Association in 1923 "to consider the educational training of boys and girls in secondary schools for life overseas". The problem that this Committee had to face is very much similar to the problem in India at present and they advocate the teaching of agriculture in secondary schools in pregnant passages:—

"Food being the first essential of life, there seems to be excellent reason why something about foodstuffs, their production and comparative value should be studied in all schools". (If to this subject be added the preparation of foodstuffs for the markets, and the geography of the markets of foodstuffs, it would be a valuable addition pedagogically.) "By agricultural studies is not meant '*teaching to farm*'. To attempt that would be a fatal error. What is meant is the use of the farm or garden as a laboratory or workshop in the study of physics, chemistry and biology. The farm and garden and stock may be as necessary to science teaching as are the ordinary laboratories and their apparatus. It should be emphasized that whatever agricultural work a boy may do at school, it must not be considered in any sense a substitute for a definite apprenticeship on a farm (or any other form of specialised training). It should have a vocational outlook, but must not

take the form of vocational training. Its purpose is educational. Practical work on the land is as necessary to any course of agricultural studies as practical work in the laboratory is to chemistry. Agriculture without practical work out of doors loses most of its educational value as a subject in the school."

If it be admitted that no education is sound which in its elementary or early secondary stages does not provide for some hand work, specially for types of boys, like sons of agriculturists, who can learn little through any other method and if the teaching of agriculture without practical out-of-doors work is of little value, it follows that we must have agriculture taught in rural middle and secondary schools in connection with a small farm.

I advocate, therefore, the introduction of the teaching of agriculture in as many rural middle schools as possible, the attaching of farms to such schools and the selection of such high schools in rural areas as can provide suitable land. For this purpose agriculture should be introduced into the Matriculation course. In Bihar and Orissa we have at present agricultural botany recognised in the Matriculation course, but not in the School Leaving Certificate course, whereas "agriculture with surveying" is recognised for the latter but not for the former. As the two examinations are now being practically converted into one, I am of opinion that agriculture should be included as a subject in the Matriculation course. In the Punjab this is already so recognised and a very large place is being given to the teaching of agriculture. In Bengal the tendency at present is all the same way.

I also advocate a Faculty of Agriculture in every university with which no specialised agricultural college is connected, or in any Province that has no agricultural school or college.

(2) *The needs of rural elementary education.*—The paramount need of a rural elementary school is to get it related to the life of the village, to make it a centre of the life of the village community. In order to do this the village school master should know and understand that he is of and for the village and not an "exotic planted on foreign soil". His training should therefore be such that he can take a proper and leading part in village life. He should have some training in practical agriculture and in the practical management of a co-operative society, *e.g.*, in the training institution already mentioned. This will enable him, with the advantages of education, not only to take a leading part in village life but to give an agricultural bias to his pupils' education and train them in practical community service for the village.

The next important thing is to bring the training school for village teachers into intimate touch with the village schools after the teachers go out, and in this way to keep in touch with the life of the village. These training schools should be the power-house of ideas for the village school master and therefore for the village. They should continuously inspire the villages not only in the work of teaching but in the work of elevating rural life.

Whenever and wherever financially possible, the project method of teaching, with the farm or the village society as the project, should be introduced, and as large a beginning should be made of teaching in rural schools by the project method as possible, as teachers trained to use that method become available. In any case, all primary school teachers should be trained to teach reading by the story method.

Mr. S. K. Roy.

Nature study should be made a compulsory subject in the curriculum and not optional as at present. If it be accepted that, pedagogically, teaching by training in observation, or, by questioning, or self-teaching is of greater value than the three Rs. then this change is necessary. It follows that the school garden or plot is essential in a village school.

It has been my experience that where the right kind of propaganda has been carried on, before and after a village co-operative society has been organised, it has been fairly easy to get villagers interested in education so far as to build a village school, to get land for it, to get the villagers to send their boys to it and to make a substantial contribution towards the salary of the teacher. In my opinion, therefore, it is necessary to give the village co-operative society a fairly large degree of administrative control of the village school. It would be necessary, therefore, to encourage the system of block grants to Central Co-operative Banks. In order, however, that there may not be conflict of interests and overlapping between the district board and the Central Bank it would be necessary and desirable to constitute a school board in every district.

(*b*) (i) The answer is obvious from the above.

(ii) I have no experience of such compulsion.

(iii) The proportion of boys who pass through the upper class in a primary school is small because of their inability to learn to read. This is, to a great extent, due to the negligence and dishonesty of the teacher and to teaching by discarded methods, but in my opinion the physiological and health causes of this inability have not been properly investigated. It is notorious that children suffering from nervous traits such as nightmares, hesitant speech, lefthandedness, rudeness to elders and emotional outbursts of crying (besides stammering) have difficulty in learning to read. An enquiry of this kind ought to be made.

QUESTION 24.—ATTRACTING CAPITAL.—(*b*) Besides the usual hinderances due to want of enterprise, in Chota Nagpur the law of resumption by the superior landlord, in the event of failure of heirs, is a great hindrance to improvement of land.

QUESTION 25.—WELFARE OF RURAL POPULATION: (*a*) I consider that the suggestions made above, if adopted, will fully open out the way of rural welfare. (*b*) Yes. The scope of the enquiry should be an attempt to discover the extent of rural indebtedness, to get a census of cattle, to find out how far fragmentation of holdings is a hindrance to agriculture, to estimate the economic sufficiency of the average holding, to make a survey of shortage and surplus of labour in different areas and to estimate how far the average capital (moveable property) of the villager is sufficient for his operations. The enquiry should be made in close co-operation with the staff of the Central Co-operative Banks. In this way this staff may get statistical training.

QUESTION 26.—STATISTICS.—I have only to suggest that the staff employed by Central Co-operative Banks should be trained for such a purpose, just as they are to be trained for demonstration and propaganda. As the Central Banks cannot maintain a staff for demonstration and propaganda, and must be subsidised so that they may employ a larger staff than they otherwise would or could, so the subsidy should be considered, keeping in view the fact that the duty of collecting agricultural statistics would have to be carried out by them.

At the end of my evidence I wish to plead for intensive application of whatever recommendations are made by the Commission in one large compact area. In my opinion Chota Nagpur or some districts of Chota Nagpur would be most suitable for such intensive application and for co-operative organisation of agriculture. I give below the advantages of Chota Nagpur in this respect over other areas:—

(1) Certain areas of Chota Nagpur have the most beautiful climate and country. The climate of Ranchi and Hazaribagh plateau is mild, neither too hot nor too cold.

(2) It has the reputation of being an arid and infertile country but if irrigation and manuring of the kind suggested in this evidence are carried out co-operatively, the whole country may be made to smile.

(3) The people are said to be backward and are believed to have been much oppressed by zamindars and conquering settlers in the past. A paternal Government has tried to protect them by special laws [(i) laws with regard to the rights of farmers to jungles and trees, (ii) limitation of mortgages and sales, (iii) resumption by superior landlord, etc.,] which are uneconomic in character. I have suggested that these laws should be repealed or modified. Instead of protecting them by legislation the utmost help should be given them to help themselves, so that co-operatively they may make the great advances that are possible. Let Government show that by co-operation even a depressed race and country may become like the Danish race or like Ireland.

(4) The character and habits of the people of Chota Nagpur make them specially suitable for the application of the co-operative principle. They have scarcely any caste feelings, they would take to co-operative poultry and pig farming as well as to cattle and goats and sheep. Through the efforts of the missionary societies the average of literacy is higher in the Ranchi district than in most districts of this Province.

Oral Evidence.

68,233. *The Chairman*: Mr. S. K. Roy, you are Principal of the Gossner High School, Ranchi?—Yes.

68,234. Have you any views as to the desirability of re-opening, either at Sabour or elsewhere, an agricultural college in this Province?—I have very definite views on the point. I have recommended in my evidence that there should be a Faculty of Agriculture connected with the Patna University, and I want a revival of the Sabour College, on the lines of the Allahabad Agricultural College, giving an Intermediate diploma.

68,235. And affiliated to the University?—Yes.

68,236. Most of your note is quite clear to me. I do not understand why, in answer to Question 5, you suggest that the financing of the co-operative movement should be achieved by linking the movement on to the proposed All-India Reserve or State Bank. What, exactly, is in your mind in making that suggestion?—The need for finance is so great that it is necessary to encourage thrift among the agricultural population throughout India.

68,237. Why do you want to join the co-operative movement on to the All-India Reserve Bank in order to encourage thrift amongst the

cultivators? I do not see the connection between the two things?—The co-operative movement would be naturally joined financially to the Provincial Co-operative Bank, and it is through the Provincial Co-operative Bank that I want the linking up between the co-operative movement and the All-India Reserve Bank.

68,238. Do you know that, at the disposal of the Central Banks in this Province at this moment, there is a large surplus of available funds which are not lent out?—I know that.

68,239. There is no shortage of capital for long-term credit?—That is because the Central Banks are not financing the movement as they should.

68,239(*a*). At the present moment, do you blame the Central Banks for the fact that they have surplus money on their hands?—I do.

68,240. What steps do you think they ought to take to use that surplus?—They should teach the villagers the proper use of credit so that they may use their own credit productively, which they do not do at the present moment. They only use their credit to pay off previous debts. Though they have it, they do not use their credit for productive purposes, and if the villagers were taught to use their credit for productive purposes, then the Central Banks would be unable to finance the demand for money in the village.

68,241. I agree that the Central Banks may have saddled themselves with more capital than they could use for the purposes for which it was acquired, but I should have thought that the blame must be attached to the fact that primary societies in the Province, according to the evidence before the Commission, are not in a healthy condition, and co-operative principles are not understood by the members of primary societies. That is the root of the trouble, is it not?—That is so with regard to the co-operative movement in this Province as a whole, at least to the extent that I know, but in the area in which I am working it has progressed on the lines on which it should have progressed.

68,242. So, to return to my original point, which is that there is no shortage of capital at the disposal of agriculturists if they are prepared to make good use of the capital, I still do not see why you wish to join the co-operative movement on to the All-India Reserve or State Bank?—Any way in which the financial position of the country could be strengthened would be welcome.

I am afraid I do not quite see the connection between the answer and the question.

68,243. On page 462 of your note, you say "I strongly advocate the adoption of new irrigation schemes by tanks or high level *bunds* or embankments alongsides of streams and rivulets throughout Chota Nagpur." What exact knowledge have you of the irrigation problems?—I have no expert knowledge, but I have in my co-operative work seen these *bunds* constructed and effectively worked.

68,244. Could you tell the Commission how exactly these *bunds* work?—I have given an illustration in my note. I have said that in the district of Ranchi, in the villages of Kochebong and Hessel, both *khas mahal* properties, 200 acres and 60 acres of land, respectively, have been brought under cultivation and are being irrigated by these high level or Kanke *bunds* (so called because they were first attempted at the Government demonstration farm in Kanke).

68,245. Those are the instances. Could you tell us how the system works?—The system is that because it is on a higher level the water percolates through the tanks to the lower level on which cultivation is

going on, and in times of drought the water is carried into the fields by mechanical means.

68,246. Your high level *bunds* are *bunds* across streams at levels above the culturable land, and the water is held up instead of flowing over the soil and disappearing, percolates into the soil and subsoil, and moistens and fertilises the land on the lower level?—Yes.

68,247. Do you think that a special engineer, skilled in that particular work and available to advise cultivators how best to carry out these schemes, may be of good service?—I do not know about a special highly paid engineer. I know of one expert in the Agricultural Department who has been doing this, and an officer of that type, set apart for that duty in Chota Nagpur, would be quite enough.

68,248. The point is that he should be set aside for the purpose?—Yes, I do advocate that. I should like to add that I believe the irrigation scheme in Chota Nagpur would be of great advantage from the point of view of Orissa also, by holding up the water that flows away from Chota Nagpur into Orissa and causes these repeated floods.

68,249. In answer to Question 20, on marketing, you are talking about the organisation of federations of village co-operative societies directly controlled by the State. Do you think you can reconcile the principle of co-operation with State control?—If it were possible to have a special Act for the purpose of controlling these marketing federations, and under that Act a non-official body were created, I think it would be possible to carry out the idea that is there. At the present moment the co-operative movement is not so advanced that it can do without State help or co-operation in India. I think that, in almost every direction, State help is necessary.

68,250. Would you agree that State control is entirely repugnant to the first principle of co-operation?—I do agree with that as a principle.

68,251. How about compulsory education? Do you favour compulsory education in rural areas?—I do, and especially the compulsory education of zamindars.

68,252. Especially the compulsory education of zamindars?—Yes.

68,253. Would you like to see an Act brought into the local legislature compulsorily to educate the zamindars?—Yes.

68,254. Who, do you suggest, should pay for their education? The public tax-payer?—I do not know; the zamindars might be taxed for their own education.

68,255. *Mr. Calvert*: You suggest that the Reserve Bank could lend money to the central co-operative marketing or sales board. What would be the security?—The security must be worked out from the bottom; that is, the board will have the security of the sale societies which carry out the sales, and they would have the security given by the federation of village societies.

68,256. What does the Reserve Bank get as security?—It gets the security of the central co-operative marketing board as it stands.

68,257. What security has the board to offer?—The board has to offer the security of all the village societies that federate into the board.

68,258. What exactly would you put into the Reserve Bank's safe?—There would be no cash security but the security would be on the property or on the credit position of every villager who joins in the movement.

68,259. Would there be any handing over of documents?—There must be a regular system, as you have at present, of each member of the society giving his unlimited liability. He must also stake his liability to a certain extent for this purpose.

68,260. The board would not hand over any documents to the Reserve Bank as security for the loan?—They can only hand over the security of the societies.

68,261. For these multi-purpose societies you want special legislation. What special legislation do you require?—I have indicated on page 465 what Government should do. I suggest that whole-village societies should be given all the powers and privileges of village unions.

68,262. They will become Local Government bodies practically?—Yes.

68,263. *Professor Gangulee*: Why not call them village unions in that case?—Village unions, as they are organised at present, are for a different purpose. They have a different object altogether. If we call them village unions, the purpose will be misunderstood.

68,264. You cannot possibly inculcate your ideas of whole-village organisations into the village unions?—Not as they are organised at present. We have a different object to carry out in the co-operative line.

68,265. *Mr. Calvert*: On page 466 you say "Such organisations should be recognised by an amendment in the Co-operative Societies Act". What amendment do you recommend?—The Co-operative Societies Act should be so amended as to give such a non-official body as the Co-operative Federation of this Province a definite place under the rules, with definite functions to perform. For example, I may point out that in this Province audit is supposed to be one of the duties of the Registrar but the audit in this Province is carried out by the Co-operative Federation and there is no rule by which, legally, the Co-operative Federation can levy contributions for audit from the village societies. But they are doing so. At any moment there may be a critical stage in which the whole question would become doubtful as to whether the audit can be carried out by the Federation.

68,266. On page 461 you say that limitation of the right of mortgage and sale does more harm than good? Is that based on your experience?—Yes.

68,267. In what part of the Province?—In Chota Nagpur.

68,268. Your experience is confined to Chota Nagpur?—Yes.

68,269. *Sir James MacKenna*: In answer to Question 23 (*b*) (iii), you give a new and somewhat original theory of the wastage that takes place in primary schools. You say: "The proportion of boys who pass through the upper class in a primary school is small because of their inability to learn to read. This is to a great extent due to the negligence and dishonesty of the teacher and to teaching by discarded methods, but in my opinion the physiological and health causes of this inability have not been properly investigated. It is notorious that children suffering from nervous traits such as nightmares, hesitant speech, left handedness, rudeness to elders and emotional outbursts of crying (besides stammering) are very difficult to teach reading. An inquiry of this kind ought to be made". Are these conditions widely prevalent in this Province?—Not in all of it. Some of them are prevalent among people in Chota Nagpur especially.

68,270. Do you think that left handedness is a sign of mental deficiency?—Psychologically it is an open question whether it is so or not,

and that is why I have pointed out that it should be made the subject of investigation.

68,271. Do you think that this mental deficiency is widely prevalent in Chota Nagpur?—Some of these defects are.

68,272. Do you think they are serious enough to demand special investigation?—Not only that, but even from the general pedagogic standpoint it is a subject that should be investigated.

68,273. How would you deal with these unfortunate children?—There should be special teachers for them and they should get separate treatment altogether.

68,274. *Professor Gangulee*: With regard to these instances of mental deficiency that you have given in your note, are they based on observation in your schools?—Yes, in schools in Chota Nagpur.

68,275. Have you published any account of your observations?—I have not as yet.

68,276. Are you familiar with the co-operative movement?—Yes.

68,277. Would you describe to the Commission the main features of the very best co-operative societies that you know?—Take, for example, the society in the Khunti sub-division about which Mr. T. P. Ghosh gave evidence yesterday. It was organised on the whole-village plan and the object was not merely the promotion of credit but the promotion of the welfare of the whole village.

68,278. Most of the societies are not based on what you describe as the "whole-village" organisation?—'A' class societies are classed as such if they simply pay off all their loans and have very frequent meetings.

68,279. Do we then understand that, in this Province, you have only one centre where you have a co-operative society which is really co-operative?—In the Khunti sub-division there are several societies which are coming up to that standard, though not up to the standard of this very one which was the first one to be organised.

68,280. What is the secret of the success of this "whole-village" organisation in the Khunti sub-division?—Propaganda of the right kind.

68,281. Do you find similar elements in any other part of the Province where such schemes could be made successful?—At present there are none that I know of. There are few people interested in the co-operative movement and who have been moved by high ideals. There is a possibility of developing this kind of organisation if the right kind of propaganda could be instituted.

68,282. The right kind of propaganda suggests the right kind of men. Do you see any indication of the right kind of men coming forward?—I think there is, at present, great hope for the co-operative movement in this Province.

68,283. If you were given the sole charge of this plan of "whole-village" organisation, could you recruit a sufficient number of non-officials to carry on the propaganda?—I certainly think so.

68,284. On page 466 you tell us what non-official agencies should do and you cite a number of instances. Why is it that the non-official agencies are not doing the things that you suggest?—Simply because they have not been inspired by the right ideals. The co-operative movement has been looked at merely as something intended to promote banking.

68,285. On whom do you depend for this inspiration that you want?—On a few people who are already inspired by the right ideals.

68,286. You do not look to the State for supporting you in the co-operative movement?—Not entirely, but there are one or two people in the State department who are inspired by the highest ideals.

68,287. Cannot the State do anything to assemble these non-official agencies to help the co-operative movement in achieving its ideals?—Very little.

68,288. Then you are of opinion that the moral responsibilities of the whole movement must rest on the people?—Yes, on the Co-operative Federation. The trouble at present is that a number of people who take an active interest once a year at the time of the Congress of the Co-operative Federation do not, when they go back, continue to take the same interest that they should, and that is simply because this idealistic propaganda, of which I have been speaking, which ought to be undertaken has not been undertaken among the people who are the workers.

68,289. On the question of irrigation, do you know of any instance where *bunds* had proved to be a failure because technical advice was not available or was not sought for?—Yes, I know of a few instances.

68,290. You recommend the appointment of a special officer to go into this question. Would such an officer have enough work and enough advice to give to the people if he were appointed?—Whenever a member of a society wants a *bund* put up, he invariably comes to the Agricultural Department and seeks their advice as to how such a *bund* should be put up.

68,291. You appear to attach a great deal of importance to chemical research. May I know the reason why?—My opinion on this matter is merely theoretical. Looking at it from the layman's point of view, I think that chemical research has done much more good than anything else.

68,292. Have you ever visited Pusa?—No.

68,293. *Mr. Kamat*: Your replies to the questions in connection with the Reserve Bank and the linking up of the co-operative movement to the bank were not clear to me. I would like to ask you whether you had in mind the suggestion made in certain quarters that the method of linking up was to be like this: Where the Imperial Bank has no branches but there are good co-operative banks, such banks should be allowed to do the agency work of the Reserve Bank. Is that what you had in mind?—I had in mind, chiefly, the most illuminating note by Sir Daniel Hamilton on the subject of the linking up of the Reserve Bank with the co-operative movement.

68,294. *Professor Gangulee*: You read his note before you wrote this statement?—Yes.

68,295. *Mr. Kamat*: With regard to the agency work being done by the co-operative banks for the Reserve Bank, what is really meant is that such co-operative banks should be allowed to do banking such as dealing with *hundis*, negotiable instruments, and the like. Are you mixing up the two things, that is, lending and borrowing from the Reserve Bank and the agency work which I have just indicated to you?—I think both.

68,296. You want Central Banks or co-operative banks to do both? You must remember that in the case of lending the question of security comes in, but in the case of the agency it may not. Do you wish both to come in?—Yes.

68,297. *Mr. Danby*: You say that the limitation of the right of mortgage and sale does more harm than good?—Yes.

68,298. Is this based on your experience of Chota Nagpur?—Yes.

68,299. You have no experience of any other part of the Province?—No.

68,300. *Mr. Calvert*: What harm, may I know, has the limitation of the right of mortgage and sale done?—In Chota Nagpur, the people part with land for a much less value than is obtained in the market.

68,301. Is your statement based on a careful inquiry or examination of the value of land over a long series of years?—Yes, and also on the work done in the Settlement Department in connection with land settlement areas.

68,302. Is the value of land less now than what it was before?—I do not know.

68,305. Would you be amazed to know that the value of land is now a hundred times higher than it was before the restrictions were imposed?—Yes, I would be surprised to hear that.

68,304. You have not got figures to show whether the value of the land is less now than it was before the restrictions were made?—No, I have not got any figures.

68,305. *Professor Gangulee*: With regard to the question regarding the value of land, about which you just spoke, does not that depend upon the price factor?—It depends on many other things as well; it depends on the value of the lands in adjoining places throughout the whole Province.

68,306. And on the value of the rupee also?—Yes.

(*The witness withdrew*).

Mrs. R. V. NORRIS, Director and Bio-Chemist, Lac Research Institute, Namkum.

Note submitted by the Indian Lac Association for Research.

The Indian Lac Association for Research was formed in 1921 as the result of an enquiry into the state of the lac and shellac industry called for by the Government of India.

The importance of the industry to India consists in the fact that, as far as the natural product is concerned, the country at present enjoys practically a world wide monopoly which brings in on an average five million pounds sterling a year.

The association is managed by a committee of Europeans and Indians representing all branches of the trade and is one of the associations recognised by the Bengal Chamber of Commerce.

Funds are obtained by a small cess imposed by the Government of India on all exports of lac, manufactured and unmanufactured.

The objects of the Lac Association for Research may be briefly summarised as follows:—

To establish the lac industry on such a sound commercial basis that there would be no fear from—

(*a*) A synthetic product such as affected indigo.

(*b*) The establishment in other countries of the lac insect itself such as was done in the case of silk.

Unfortunately, the lac market is a highly speculative one, due to various causes, and the result has been that chemists in other countries

have turned their attention to the production of synthetic substitutes. How far this has been successful is shown by the following figures which are given for only one of the many trades into which lac, or shellac (the article manufactured from lac), enter.

In 1921, seventeen American factories produced one-and-a-half million gallons of lacquer. Two years later forty-one factories produced three-and-a-half million gallons, and by 1925 eighty-five factories had brought production up to eleven million gallons. Authorities state that French production is about one-fifth, and German three-fifths, of the American manufacture, and that the British output is about equal to the French.

Lac is used in a great variety of trades, of which the gramophone record and the paint and varnish trades are perhaps the most important.

The figures given above refer to the paint and varnish trade; it is now possible to manufacture gramophone records also from substitutes, but this so far is not a financial proposition from the trade point of view. The electrical trade, which also used to depend entirely on shellac for many purposes, has now turned its attention to substitutes and present opinion points to the possibility of shellac being entirely ousted from this branch in the course of a very short time.

The position, therefore, before the Indian Lac Association for Research is very serious.

The trade at present provides employment for many small growers and small manufacturers, the industry apart from a few large concerns being mainly a cottage one.

Lac, being a natural article, suffers from the usual disabilities of climate, and, also, when it is considered that it is the product of an insect which itself thrives as a parasite on various host trees, there are many more points to be taken into consideration than with an ordinary field crop.

The main drawback at the present moment is the violent fluctuation of the market which gives an enormous advantage to synthetic substitutes which can be produced at more or less standard rates and also of standard quality, which again places a natural article at a disadvantage.

As regards rosin and insoluble impurities, the main importing countries such as America and England each have their own arbitrary standards which do not at present coincide.

In the case of America they are as follows:—

In the event of any lot of pure grade shellac containing rosin or of United States Association TN containing more than three per cent rosin, allowance is made of one per cent of invoice value for one per cent adulteration and two per cent of invoice value for each additional one per cent adulteration.

In the event of any lot of TN shellac containing more than three per cent alcohol insoluble impurities, or of any shellac intermediate in grade between TN and superfine containing more than two-and-a-half per cent alcohol insoluble impurities or of superfine shellac more than one-and-three-quarters per cent alcohol insoluble impurities, allowance is made of one per cent of invoice value for one per cent insoluble impurities and two per cent of invoice value for each additional one per cent insoluble impurities.

In the event of any lot of seed lac or stick lac containing more than a guaranteed or agreed-upon maximum of alcohol insoluble impurities, allowance is made of two per cent of invoice value for each two per

cent above agreed or guaranteed maximum insoluble impurities content.

In the event of any lot of shellac containing water solubles in excess of one-half per cent, allowance is made of one per cent of invoice value for each one per cent water soluble in excess of one-half per cent.

In the case of England they are as follows:—

In the event of any lot of TN shellac containing more than three per cent rosin an allowance is awarded of the percentage exceeding three per cent upon the invoice value. If any lot contains more than ten per cent rosin the buyers have the option of invoicing it back to the sellers at a price fixed by arbitrators. If quality, generally, is inferior to the standard a fair allowance is to be made. No allowance except for quality is made on any lot arriving blocky or out of condition.

In the case of Calcutta they are as follows:—

In the event of any lot of pure grade shellac containing rosin or of rosinous shellac containing more than the agreed-upon amount, an allowance of eight annas per *maund* for every one-half per cent or part thereof up to one per cent, and two rupees per *maund* for each additional one-half per cent or part thereof.

In the event of any lot of shellac containing more than three per cent insoluble impurities an allowance is made of one rupee per *maund* for each one-half per cent or part thereof above three per cent and up to four per cent impurities, and two rupees per *maund* for each additional one-half per cent or part thereof.

I consider that it would be to the advantage of the trade in general if there were a set of standard grades which were the same in all countries.

Apart from this, much remains to be done in order to get the market into a healthy condition. Fluctuations in price according to crop yields are difficult to avoid, but apart from this it should be possible to improve the trade in many ways. As I have already stated, the bulk of the cultivation and also the manufacture is in the hands of more or less illiterate and untrained people. The actual grower, the ryot, for example, strips his trees when prices are good and thereby leaves himself with insufficient brood for the ensuing season. He then either has to pay a high price for his fresh brood lac or else he leaves many of his trees uninfected, with a consequent loss of crop later.

The small manufacturer also, if shellac prices are low, will frequently keep large quantities of stick lac in stock and only make them up when the market is favourable, by which time the quality has deteriorated. He also adulterates and in the course of his manufacture frequently uses a single bag instead of a double one, thereby allowing an increased percentage of impurities to appear in the finished article.

The association have had several suggestions put before them in order to remedy this state of affairs.

In the first place it has been proposed that, alongside the actual work done by the association, the various Provincial Governments of Provinces where lac is grown should be interested in the question, and help according to the problems presented in each Province.

The Government of Bihar and Orissa, which comprises one of the main lac growing areas, has already taken steps and has started several small plantations, under Government control, which are intended to serve as brood farms so that when brood is scarce from whatever reason the ryot will be able to purchase it at as fair a rate as possible.

Mrs. R. V. Norris.

The Government of Assam has also shown its willingness to help and has asked the association to advise it as to the best means of promoting lac cultivation. At present nothing further has been done with other Governments.

The result of enhanced cultivation would be to lower prices so that although there would still be fluctuations they would not be so violent, and this would help the trade to meet the synthetic menace on a more secure basis.

Other proposals have been that the sympathy of Government co-operative societies should be enlisted so that the cultivator could obtain loans for the purchase of brood lac and thereby avoid getting heavily into debt with the village *bania*.

This is done to a certain extent in Bihar and Orissa but much more might be done in this direction.

It has been suggested also that propaganda work should be undertaken amongst both growers and manufacturers and that current Calcutta market prices should be posted in all the principal lac markets. This, in the case of cotton in the Punjab, has had a very steadying effect on prices.

The possibilities of forming central marketing agencies in order to cut out the profits made by the middlemen has also been considered, but the committee of the Indian Lac Association for Research are of the opinion that their formation is more a matter for the Provincial Governments, through the co-operative societies.

Recently, a suggestion has been made to the association that the personnel of the committee should be increased to admit officials from lac growing Provinces or other people interested in the industry; that is to say more on the lines of the Indian Central Cotton Committee. The committee of the association, however, do not consider that this is necessary and feel that the same results can be obtained by quarterly or half-yearly meetings of Provincial delegates with the association.

The above summarises very briefly the state of the industry at the present time and the ever increasing competition which it has to face.

In view of its importance to the country and the present difficulties with which it has to contend, this memorandum has been drawn up for the information of the Royal Commission on Agriculture.

Oral Evidence.

68,307. *The Chairman*: Mrs. Norris, you are Director of the Lac Research Institute?—Yes.

68,308. Where exactly is it?—Five miles outside Ranchi on the Chota Nagpur plateau.

68,309. A good deal of information about lac cultivation is already before the Commission, and there are just a few points about which I should like to ask you some questions. You say that the cultivator is represented on the organisation which you represent? How is he represented?—The actual Indian cultivator, I should say, is not represented on the committee; he could become a member of the association if he wished. The actual growers who are represented are people of the type of Messrs. Rogers Pyatt and Angelo Brothers.

68,310. This Commission, you will understand, is more interested in the grower's interest than in the interests of any other person or group of persons concerned with the industry, but at the same time we understand that unless lac can be manufactured, distributed and sold at a profit, the cultivator will not get his price?—That is so.

68,311. Do you think the interests of the cultivator, the actual grower, are adequately represented on your organisation?—I do not think so.

68,312. Do you consider that it would be of advantage to all concerned if things were different in that respect?—Yes.

68,313. Have the economics of lac growing, from the cultivator's point of view, been sufficiently examined, do you think?—No; the Research Institute at Namkum has actually, I think, been working for two years, and there is a small experimental plantation which had to be planted and naturally the host trees took some time to grow.

68,314. Lac growing makes a very welcome addition to the income of the cultivator?—He does not get most of the benefit from it, though. A lot of the lac trade is in the hands of very ignorant villagers and before it finally reaches the manufacturer or the Calcutta market, it passes through the hands of a good many middlemen.

68,315. Do you think that villagers engaged in the industry might, with advantage, be organised on co-operative lines?—I think a great deal might be done in that direction.

68,316. Having regard to the competition of the synthetic article, do you think that there is danger in recommending a too sudden or too widespread extension of lac production?—No, I think that it is one of the main things that will help; the menace at the present moment is extremely serious.

68,317. Do you think that a larger supply of the natural article would strengthen the position of the natural article in the market?—It would help to keep the price down.

68,318. Are you satisfied that the synthetic article cannot be sold for profit at a considerably lower rate than the prices at present ruling in the market for the synthetic article?—I could not tell.

68,319. Is not that a rather important factor, having regard to your last answer?—All I was told in England was that the natural article sold at a shilling a pound need fear no competition whatever from the synthetic trade.

68,320. *Sir Thomas Middleton*: What is the composition of your staff at the Research Institute at Ranchi?—I am myself Director and Bio-chemist, but I never have the time to do any chemistry at all. I have one European Entomologist, four Indian Assistant Chemists, and three Indian Entomological Assistants; and there is the usual clerical staff.

68,321. What are the subjects that you are chiefly engaged in?—On the chemical side, on the cultivation of the crop and improvements in that direction, and on the entomological side, the life history of the insect and of its enemies.

68,322. When you say the cultivation of the crop, do you mean of the plant on which the insect breeds, or the crop of lac?—Both the insect and the plant.

68,323. What plants are you cultivating for the purpose?—There are five main host trees which are the commercial ones. The insect will live on quite a number of trees, but from the commercial point of view only about half a dozen are worth considering, and those have been planted out extensively; for other things there are only little trial blocks to see what kind of crop can be grown on them.

68,324. *The Chairman*: I ought to have added one more question to the series of questions I put you at the outset. Can natural lac be produced, and sold at a profit, at prices much below those ruling to-day?—Yes, it can.

68,325. *Mr. Calvert*: The members of your association are mostly Calcutta merchants, are they not?—Yes.

68,326. Have you any control over the funds of your association?—None whatever.

68,327. They are entirely in the charge of your association?—Yes.

68,328. Do those funds consist entirely of the proceeds from the lac cess?—There is a certain amount from members' subscriptions. The membership is, I think, Rs. 25 quarterly, but I do not think that this brings in more than about Rs. 6,000 a year.

68,329. Does the association control you in your research work?—Yes.

68,330. Have there ever been offers of financial assistance from outside for the expansion of the research work?—America is very anxious to help. I was over there this year. They have a Lac and Shellac Importers' Association, and they are very anxious to help in advertising and propaganda, and also in research work on shellac for different trades. The trouble is about raising the money. These importers will not say how much they import. It was suggested from this end that they should collect extra money through their customs who would know exactly how much shellac was going into the country, but they said that this was impossible as there were no taxes of this nature in the country at present, and if a tax was imposed the other interests would be up in arms at once, and therefore nothing could be done.

68,331. Is any research carried on with the object of producing a standardised product?—No.

68,332. *The Chairman*: Could you tell the Commission whether the wholesalers in America and Europe deal in both the natural and the synthetic article?—Yes; they do.

68,333. And they are concerned, of course, only with the profits on their turnover; and I imagine they have no particular interest in selling the natural as against the synthetic article?—No. One of the biggest gramophone companies in America is quite prepared to work either with the synthetic shellac or the natural shellac.

68,334. They are indifferent?—Absolutely indifferent.

68,335. *Dr. Hyder*: In the area in which you are operating, on what trees does the lac insect grow?—Do you want the botanical names?

The Chairman: We have a complete list.

68,336. *Dr. Hyder*: I was wondering whether you had a large area under *butea frondosa*?—The Bihar and Orissa Government have, in the Palamau district.

68,337. What is the amount of cess levied?—It is four annas a *maund* on shellac or lac exported, and two annas a *maund* on refuse, that is, residues in the *bag* after the manufacture. It is only two annas a *maund* on that, but four annas on everything else, manufactured or unmanufactured.

68,338. Is anything exported from Burma?—Yes; it comes into Calcutta.

68,339. Could you tell us what arrangements are made in Burma?—I do not know what the arrangements are in Burma.

68,340. *Professor Gangulee*: In your association, does the Government of India have a representative?—Not that I know of.

68,341. Could you say what control the Government of India exercises over this association?—None.

68,342. The Imperial Entomologist, Pusa, has nothing to do with you?—Nothing at all.

68,343. The cess is simply handed over to the association; there is no control over it; is that the position?—Yes.

68,344. Have you to submit any account of your work to the Government of India?—No.

68,345. Brood farms are very important for the extension of lac cultivation; have you any farms?—No; the Government of Bihar and Orissa have taken over that work.

68,346. Assam?—Assam is only just starting lac cultivation; nothing much has yet been done.

68,347. What research side of the problem requires most attention for the extension of lac cultivation?—You mean to increase the growth?

68,348. Yes?—I should say, the study of parasites would give the quickest result.

68,349. Is any one engaged in that work?—We have a European Entomologist who arrived only six weeks ago; he has just started work.

68,350. Does the speculative character of the market affect lac cultivation?—Yes; it does to a certain extent.

68,351. *The Chairman*: Does the sale of the synthetic article reduce, at all, the world consumption of the natural article?—Not at present, because they frequently use the natural article in the nature of a preliminary coating which helps the synthetic to stick better. At the present moment, it has actually given us as much trade as it has taken away, but that will not continue. I am speaking now of the paint and varnish trade.

68,352. It would depend upon the capacity of the natural lac producers to substantially reduce the cost to the consumer while retaining the net profit; your defensive resources have by no means been exhausted?—No. But the gramaphone trade is probably the biggest purchaser of natural shellac, and gramaphone records can be made now from synthetics without a scrap of natural shellac, although it has not proved a financial proposition yet. That is our biggest trade with America.

(*The witness withdrew.*)

Mr. N. K. ROY, Assistant Registrar of Co-operative Societies, Ranchi Circle.

Replies to the Questionnaire.

QUESTION 1.—RESEARCH.—(c) One of the most important lines of investigation and research is intensive study as regards the traditional practices and cropping system of the average holding, how far these are due to definite reasons which, rightly or wrongly, the cultivators are able to urge in justification of their soundness, and how far they are due to mere want of knowledge as regards improved methods. The most fruitful and valuable research is to experiment on average holdings with the co-operation of average cultivators and see how far, by applying improved methods and changing the cropping system, an appreciable improvement can be brought about in the economic condition of the ryots concerned, what are the obstacles, educational, social, financial, which stand in the way of extension along the same lines and how best they may be removed.

Another line of research which is not being investigated fully is in regard to the food value of the different cattle foods available in the country for purposes of (*a*) increasing the milk, and the butter-fat content in the milk, of milch animals, and (*b*) increasing the efficiency of work-bullocks and buffaloes.

A long series of food tests carried on in co-operation with cultivators ought to give valuable results.

QUESTION 3.—DEMONSTRATION AND PROPAGANDA.—(*a*) The measures which have been most successful in influencing and improving the practice of cultivation are demonstrations of the improved methods conducted on the ryots' field by the ryots themselves.

(*b*) Field demonstrations can be made most effective by inducing the cultivators themselves to try the experiment under expert supervision. The experiment should be specifically designed to show the difference between the existing and the new methods. When the experiment is a success, its effectiveness would be heightened by organising a demonstration lecture of a practical kind, to prove by results the superiority of the improved method. I mean, it is not enough merely to substitute the improved method and leave the ryot to draw his own conclusions; the traditional and improved methods should be exhibited side by side and the lesson followed up by the results being subjected to a crop-cutting test in which the residents of the village and surrounding villages are induced to take an intelligent part.

(*c*) The best method of inducing cultivators to adopt expert advice is to utilise, to the full, meetings of co-operative societies where members are habituated to discussing matters of practical interest. Such advice will only be considered in a serious way when emanating from a person who is in sympathetic touch with the cultivators, such as, the inspecting officers of co-operative societies. It follows therefore that the best results can only be expected by familiarising co-operative workers with those improved methods, which are sought to be introduced, by a specialised course of training which would have for its object just this kind of propaganda work. Once these experiments are made and are proved a success to the satisfaction of the ryots others are bound to copy them and they will then spread to other villages rapidly enough. But such work takes a lot of time and unless supervising officers employed by co-operative banks have plenty of time to do this kind of patient and earnest propaganda, by discussions in meetings, followed up by personal canvassing, progress will be slow. The Central Co-operative Banks have limited funds and cannot employ more than one clerk for every forty to forty-five societies. Their time is more than fully occupied in the routine work of inspection and removal of audit defects. Unless the charge is reduced to twenty societies per clerk, there can be no appreciable progress in such demonstration and propaganda work. The only possible way of accelerating the progress is for Government to subsidise the co-operative banks with the cost of one additional clerk for every forty societies. Government help, in my opinion, is more than justifiable. No progress is possible without an effective system of demonstration and propaganda. At present the Agricultural Department has no adequate staff of demonstrators to work in the villages. The research work that is being done in the Government experimental farms has no practical value unless there is a system which directly aims at multiplying the best. The best possible system is to create an organic connection between the activities of the Agricultural Department and the life of a co-operative society. Any

improved method which is worth teaching would be far more likely to be tested among cultivators who are co-operatively organised, than elsewhere. It is the business of the Agricultural Department to see that it is so tested. All that is necessary at present to give effect to this plan is, firstly, to provide, at Government cost, the kind of specialised training needed for this kind of work to all co-operative workers, and then to subsidise the Co-operative Central Banks through the Co-operative Federation to enable them to employ an adequate number of such trained workers.

The success of such demonstration and propaganda would, however, greatly depend on the character of the organisation set up in the villages. This point is of supreme importance as I am convinced, after twelve years' intimate touch with the ryots, that a well-ordered village organisation must form the basis of all reform, I have discussed this matter at some length in my reply to Question 22.

(*d*) A striking instance of success in demonstration and propaganda work is to be found in Peloul Co-operative Society affiliated to the Khunti Central Co-operative Bank. The members of the society were induced with great difficulty to grow sugarcane jointly on a plot of land. (Sugarcane is an entirely new crop in this area.) The success of the experiment has resulted in every one in the village cultivating sugarcane this year. In the same way, groundnut, also a new crop, is now being cultivated by all. The reason for the success is due to the fact that the co-operative spirit had previously been aroused by systematic education and training in joint enterprizes. That is the reason why not only are new experiments easy to introduce but, when once they are undertaken, they are so readily copied by everybody else. The opposite example of failure was experienced in another society in village Kutey, under the Ranchi Central Co-operative Bank. In this village there is an ordinary credit society of the old type, *viz.*, a mere loan institution in which the only bond between the members is the need for loans. No member could be induced to try the experiment of growing sugarcane, though the Agricultural Department offered to lend the services of a *kamdar* and to give fertilisers free. The zamindar of the village, who is the joint secretary of the bank, allowed his land to be used for the experiment and this was conducted by the zamindar's servants with the help of the *kamdar*. The sugarcane was a great success. But next year not a single member wished to copy it. The reason was two-fold. The experiment was not done by any of the ryots on his own field and its success had no practical interest for the members as the matter was not discussed in a practical way and they had not learnt to think of any new enterprise with any spirit of confidence.

QUESTION 5.—FINANCE.—(*a*) I have no doubt that by far the best mode of financing agricultural operations is to organise a net-work of co-operative societies throughout the country on the whole-village plan. The plan simply is to enlist in every society, as members, men whose intelligence, character and enterprise entitled them to become local leaders, and by enlarging the scope of the society's activities and increasing the membership, make the society a live organisation. The problem is not merely to provide facilities for finance as if the productive expenditure of loans only needed such facility for its exploitation. The defect is far more fundamental. The cultivators simply do not know the productive uses of loans. We have to educate and train them up to better means of production. The society has to function as a school for adults and demonstration and propaganda are to be the means of their education. It is only thus that agricultural operations will ever be adequately financed in any village. Once

the object is achieved in one village, it will serve as an object-lesson to all and will be the best propaganda for similar societies elsewhere.

Without a net-work of such healthy and vigorous organisations in the villages, the mere provision of credit facilities will achieve very little. It is the practical knowledge of progressive agriculture which can make finance a real aid to increased production. What is wanted is self-help made effective through organisation. Definite suggestions for creating such a net-work of societies have been made in my reply to Question 22.

The provision of short and long term credit.—For short-term credit, co-operative societies, where they exist, at present fulfil all the requirements of the members. Long-term credit can be arranged if the Provincial Co-operative Bank is helped by Government in either of two ways—(1) guaranteeing the issue of long-term debentures; (2) placing at the disposal of the Provincial Bank for a long term a certain portion of the savings bank deposits of post offices or of the surpluses in the Imperial Bank. The rate of interest to be charged to the Provincial Bank should not exceed three per cent. This will enable the Provincial Bank to advance loans to the Central Banks at four per cent and the Central Banks could advance them to the societies at six per cent and the latter to their members at eight per cent. Unless loans are made available to the cultivators at eight per cent it is impossible to take up the question of debt redemption seriously at all. Productive expenditure on land improvements such as excavation of tanks, construction of *bunds*, digging of wells, etcetera, will never be taken up on a scale which will have any appreciable effect on the prosperity of the agricultural classes, unless the rate of interest is reduced to eight per cent.

(*b*) I do not consider *taccavi* loans as at all a suitable means of financing agriculture.

QUESTION 8.—IRRIGATION.—(*a*) (i). So far as my experience goes there is vast scope for the extension of irrigation schemes, but different districts call for the adoption of different methods.

Hill-streams and rivulets abound in Chota Nagpur and most of them offer possibilities of being utilised for irrigating adjoining fields for sugarcane or other crops requiring intensive cultivation, and for converting waste lands into cultivable fields. The appointment of a special irrigation officer having experience of these minor projects is necessary to extend these schemes.

(ii) In two districts, *viz.*, Purulia and Sambalpur, there is vast scope for the excavation of new and re-excavation of old tanks and reservoirs for irrigation purposes. The configuration of the country is such that the construction of new *bunds* is a comparatively simple and inexpensive proposition. Most of the old tanks, over fifty thousand in number in Purulia alone, have been allowed to fall into disrepair or be silted up, with the result that the cultivation of these districts must have suffered very greatly. The best method is to organise co-operative societies in the villages in which such scope exists and get the members interested to undertake joint excavation of such tanks. This can easily be done by a whole-time paid organiser in each of these districts, who would concentrate on this work. In other districts of Chota Nagpur there is considerable scope for introducing the system of high level *bunds* (called Kanke *bunds* after the name of the Government farm at Ranchi where it was first introduced). In this case also, co-operative societies, where they are well organised, would offer the greatest scope for extension. Where the scheme consists in converting waste lands into fields by a system of these *bunds*, there would be

little difficulty in getting tenants to combine for the purpose. Where the *bund* has to serve existing fields of varying sizes belonging to different tenants, the organisation is much more difficult. But there can be no doubt that a special agricultural officer with sufficient experience of this particular kind of work could, in co-operation with the Co-operative Department, help to extend these systems enormously. The appointment of such an officer appears to be urgently called for.

(iii) As regards surface wells there is unlimited scope for their extension and co-operative societies can encourage their extension by special propaganda designed for the purpose. But loans for well-digging require a long period for repayment and, as they involve substantial outlay of initial capital, a low rate of interest is necessary to induce cultivators to take such loans. I have suggested elsewhere that for such permanent improvements loans should be available at a rate not exceeding eight per cent.

As regards tube wells, I am of opinion that experiments should be conducted by Government in Chota Nagpur with a view to finding out the cost at which such wells can be bored and the area of land which they can irrigate. In an area where the ryots are so poor and where the scarcity of water for irrigation is as pronounced as it is in Chota Nagpur, experiments with a view to exploring every source of possible irrigation can only be made by Government.

The obstacles to the extension of irrigation by the above methods are the want of a well-defined policy in regard to them and the financial stringency in the provincial exchequer.

QUESTION 10.—FERTILISERS.—(*a*) In many parts of this country, the use of manures like oil-cakes is entirely unknown. Artificial fertilisers like gypsum, sulphate of ammonia, nitrate of soda and superphosphates are hardly used by cultivators who go in for extensive cultivation. But even for intensive cultivation the use of such fertilisers is very rare. In all these directions there is unlimited scope for extending the profitable use of fertilisers.

(*b*) Fertilisers should be sold through co-operative agencies only and should be supplied by reliable wholesale dealers in sealed bags of moderate size.

(*c*) Systematic propaganda and demonstration on the ryots' fields through the help of co-operative societies is the best means of extending and popularising new and improved fertilisers. It would be necessary at the beginning for Government to give a suitable grant to the Central Banks to stock such fertilisers for the experimental demonstrations mentioned. After the demand has been created in this way, small grants for opening depôts in convenient centres for easy distribution would be necessary. Within a few years the depôts should be self-supporting.

(*d*) In my own circle, I made an arrangement with Indo-Agri. Ltd. of Calcutta by which four banks, *viz.*, Ranchi Central Bank, Khunti Central Bank, Hazaribagh Central Bank and Purulia Central Bank, were appointed local agents for the propaganda and sale of sulphate of ammonia, which was an entirely new fertiliser in these parts. The banks have been able to get a very large number of ryots to try the fertilisers on a small scale for paddy and sugarcane. Over seven hundred *maunds* of the fertilisers have been sold in these four areas.

(*e*) I think the effect of such manuring should be tested cautiously over a wide area.

(*f*) The only way in which the use of cowdung as fuel can be prevented is to encourage the ryots by continuous propaganda to plant

quick growing trees on waste lands and hedges or to introduce coal into the villages by providing special transport facilities. Efforts in this direction should be supplemented by propaganda regarding the loss caused by burning cowdung as fuel.

QUESTION 11.—CROPS.—(*a*) (i) An appreciable improvement in existing crops can be brought about by an efficient organisation for the distribution of selected seed evolved in the Government farms and of fertilisers suitable for such crops. The organisation must devise some means of maintaining a sufficient supply of pure seed, otherwise the seed, when broadcasted, is apt to get mixed up. This may be secured by arranging to have the pure strain grown under proper precautions by zamindars and big cultivators. Of course, propaganda and demonstration must precede and accompany such an organisation. The method for carrying on the propaganda has been suggested in my reply to Question 3 of the Questionnaire.

(ii) The introduction of new crops will also need the same kind of propaganda and demonstration work. But in addition, arrangements will have to be made, in the initial stages, to find a market for the new crops introduced. This is more specially true of fodder crops which have a limited market and can only be introduced as part of a scheme of extending dairy farms, cattle breeding societies and milk unions.

(iii) At present we have no effective system of seed distribution. The system I would suggest is that Central Co-operative Banks be given a grant for putting up godowns for seed (and manure), and the Government farms should stock such godowns with selected seed for distribution through co-operative societies. When a sufficient demand has been created, seed stores should be started in convenient centres. These outlying stores would be stocked with pure strain seed purchased locally after careful selection. It should be possible to arrange to buy up the very best seed after a competitive crop-cutting test carried out under expert supervision.

(iv) Agriculturists should be able to obtain licenses for guns for the protection of their crops as a matter of right. Though the provisions of the Arms Act are quite liberal in this respect, its administration in practice is not as sympathetic as might be desired. I know of several cases in which licenses have been refused, even when recommended on the ground that valuable crops have been destroyed by wild pig. A provision may suitably be introduced, laying down that licenses for such purposes shall not be refused except on very special grounds to be recorded in writing.

QUESTION 16.—ANIMAL HUSBANDRY.—(*a*) (i) This can be brought about—

1. By increasing the source of supply of good parent stock, so that these may be distributed to centres from which good animals are likely to be bred. The number of Government-managed farms for maintaining herds of animals of superior strain should be appreciably increased. Such Government farms should select and buy good animals of local breeds suitable for crossing with other strains of quality. Selected bulls, merinos, goats and cocks from such farms should be distributed for breeding purposes to co-operative unions and cattle breeding societies at a specially reduced cost. In this connection the cost of transport of animals is an important factor and I think it is necessary to reduce railway freight for all animals meant for breeding and dairy purposes.

2. By carrying on a sustained propaganda, through co-operative organisations, on the importance and advantages of selection-breeding and the evils of breeding from the unfit. The propaganda should take

the form of magic lantern lectures dealing with the question, to be carried on systematically in every important village. The lectures will be carefully drawn up by experts who understand the mentality and prejudices of the people and the slides made interesting and effective Another means which should prove effective is to arrange for systematic cattle and poultry shows to be held annually at each *thana* and to offer liberal prizes to owners of the best animals and to the best cultivators of fodder crops. These shows may be utilised fully for lectures on the subject of selection breeding. Police officers at each *thana* may well do this propaganda work when they have their hands free. Government and district boards should meet the cost of such propaganda and these cattle shows. After the people have been sufficiently educated in this matter it would not be difficult to get co-operative societies to maintain good animals for breeding and to get all the unfit bulls castrated.

(ii) This can be brought about in the following ways :—

Increasing the fodder supply of the country. No appreciable increase in fodder supply is possible until the ordinary agriculturist is induced to turn his attention to it. But he cannot be induced to do so unless it can be proved to his satisfaction that it pays to grow fodder crops. This very point ought to be made the subject of experiment and demonstration on a wide scale. The method I would advocate is simply to induce, with the help of Central Co-operative Banks, members of co-operative societies residing near towns to grow fodder crops of known value under expert supervision. The cultivator would be guaranteed a minimum price, the return from which should compare favourably with the value of other crops grown locally on similar lands. Silage should be made if thought advisable. The municipalities could be induced to provide the transport facilities and market the fodder for the benefit of the *gowalas* and other cow-owners in the town.

A great deal more in the way of investigation is necessary in regard to such root crops as turnips, swedes and mangolds which form such an important factor in the dairying industry of other countries. The cheapest way for such experiments, in my opinion, is to induce cultivators to try them, ensuring them a minimum return at the beginning. In Chota Nagpur it is possible that these root crops may be grown in the rains, with a proper system of drainage. If the cost of the crop is not found to be prohibitive, by a system of free food-tests conducted among owners of cows in or near towns, a sufficient demand could be created for such crops.

Another important means for increasing the cattle-food supply is to give special encouragement to the oil-pressing industry, as it is of national importance. Loans at a specially reduced rate for such industries under the State Aid to Industries Act might have the desired effect.

The last but not the least important of the means, in my opinion, is improvement in transport facilities. Fodder will not be grown by cultivators unless it can be cheaply transported to places where the demand is greatest. As regards railways it should be possible to fix a flat rate for fodder crops by which cattle food could be transported to any distance within, say, five hundred miles. Road transport is more difficult, but when the demonstration farms are started district boards and municipalities may well be induced to co-operate with Government in providing better transport facilities.

(iii) Starting model farms, which should be run entirely on economic lines to prove that they can be run at a profit. The model farms, which must necessarily be largely of an experimental character, should

adopt the mixed farming plan, as this offers the least chance of failure. Though the farms would be mixed farms, they would of course have dairying as their chief purpose. The plan I would suggest is as follows: Suitable *khas mahal* lands, wherever available in the vicinity of towns, should be selected for this purpose. Residents of villages near about such lands would be organised into co-operative societies. The lands would be leased to them free of rent for ten or fifteen years on condition that they maintain, between them, a herd of good cows and grow fodder for them according to the direction of the farm manager appointed and paid for by Government. The farm would be under an expert committee on which Central Banks as well as the district board and municipality will be represented. Loans will be given to the society, if required, by the Central Banks for the purpose of purchasing good cows, and the necessary seed, manure, plough cattle, etcetera, for carrying on the farm. The land will be parcelled out among the cultivators in holdings of five to twenty acres each, according to the number of persons each family can provide to work on the farm. They must grow enough fodder for the cows maintained by each. Silos will be constructed and the fodder grown stored in them. The cows will be either kept in inexpensive sheds put up on the farm or in the houses of the cultivators, as may be found convenient. The cows will be milked at a central place under the supervision of the manager and the milk marketed at the town through the municipality. Land not suitable for fodder would of course be utilised for other crops. Any shortage in the supply may be supplemented by persuading other cultivators in the vicinity to grow fodder, for which a minimum price would be guaranteed. This method of encouragement is important and there would be hardly any risk, as the surplus can always be sent to the municipal depôt in the town and sold to the local *gowalas*. Out of the sale proceeds of the milk, the members would be required to pay off the interest and principal of the loan by a system of small monthly instalments. The farm will buy from the *gowalas* all good cows with their calves when they run dry. These will be fed and maintained from the common stock of the farm, and re-sold by public auction, when they calve again. The difference between the calves fed on the farm and the calves of the city *gowalas* will convince cultivators of the value of good feeding. This should be an important side activity of the farm, for one of the main reasons for the shortage of good cows is the fact that many of these are sold to butchers for slaughter owing to the fact that the *gowalas* cannot afford to feed them at the dry period and those that are maintained suffer rapid deterioration owing to insufficient feeding, The accounts of this part of the farm's business should be kept separate and would serve the purpose of an important line of research and demonstration, *viz.*, that it is an economic loss to under-feed good milch animals.

I have suggested that the model farms should be run as co-operative joint-farming societies, encouraged and aided by Government, because it would perhaps be difficult for Government to find enough money to start and finance as many farms as we would require. But whether as purely Government farms or as co-operative farms aided by Government, one model farm in every district should be aimed at,

(*b*) (i) and (ii) Both these causes have undoubtedly operated in the deterioration of cattle. The remedy in this, as in most cases, is to educate the cultivators up to the needs of the problem by continuous propaganda through the co-operative organisation. What is probably needed is to fence in the pasture land and do grass farming in a regular way. If all the plough cattle of the village were utilised to plough up

the pasture land in season and good grass were sown, it would go a great way in mitigating the insufficiency of pasture lands.

(iii) This insufficiency can be met partly by improving transport facilities and reducing railway freight on such dry fodder, so that it may travel freely to places where there is a deficiency.

(iv) The deficiency in this respect can only be met where cultivators have been taught to grow such fodder as maize and *juar* for their cattle and store it in silos for use in dry seasons. It is also possible in Chota Nagpur to grow crops in the dry weather with irrigation, and those who have milch animals should be induced to cultivate these fodders in small plots of land where irrigation facilities exist. But this and other reforms involved in the suggestion made in previous items will only be possible on a large scale where the ryots have been co-operatively organised.

(*c*) January to June. Four to six weeks elapse before young cattle begin to thrive.

(*d*) Suggestions have been made in foregoing paragraphs.

(*e*) Landowners may be encouraged to start model dairy farms on their own lands by the offer by Government of the cost of an expert manager and the arrangement of the sale of dairy produce through municipalities. A great deal can also be done by district and divisional officers in getting landowners to take practical interest in such matters by arranging for conferences on the subject and by using their personal influence. Government may also make it clear by the reward of titles, and in other ways, that such pioneering work is regarded by Government as public service of a high order.

QUESTION 17.—AGRICULTURAL INDUSTRIES.—(*a*) In parts where only one main crop is grown, the number of days of work done by an average cultivator would be about a hundred days in the year. In parts of Bihar where two crops are grown, the number of days would approximate two hundred. He is generally idle during the rest of the year or picks up such casual labour as he can find.

(*b*) The main subsidiary industry should be hand-weaving of cotton. Facilities for learning this should be provided on a wide scale. This can be arranged in an economic way by the employment, during the slack seasons, of professional weavers to teach those who wish to learn the practical art of weaving the ordinary cloth worn by cultivators locally. One such institution with a dozen looms at every *thana* would be sufficient to begin with. The teachers may be paid a small monthly salary *plus* a suitable bonus for every person who satisfies a practical weaving test after the course of training, which would be for about six months. There is no reason why one member of every family, now condemned to enforced idleness, should not in time be taught to weave enough cloth for the requirements of the family. But hand-weaving will always suffer from competition with mill-made cloth unless Government starts one or more cotton spinning mills for the purpose of supplying yarn to the hand-weavers. The initial capital required can be co-operatively subscribed by the weaver population of the Province, if Government would provide the entire cost of expert management and supervision.

Next to weaving of cotton, I think the spinning of jute fibre and weaving into gunny cloth should be introduced and widely extended. The jute growers enjoy a lot of leisure. With adequate facilities for training them to spin and weave the fibre, a good portion of the jute may be turned into gunny bags before being put on the market. This should give employment to thousands of idle cultivators in the jute

areas. An arrangement similar to that suggested for cotton weaving would serve as a good beginning. Simple village industries like the manufacture of cart wheels and carts, elementary carpentry for the making of oil presses, and such simple furniture as *charpoys* and bedsteads, rope twisting with improved tools, should be taught in technical schools set up at each police-station. A good portion of the cost of these schools would be recovered from the value of the articles turned out by those under instruction.

(*c*) Sericulture and basket-making are more or less caste occupations, and caste Hindus have a prejudice against poultry rearing. The chief obstacle is want of knowledge and of facilities for learning. There is a wide scope for their introduction if adequate facilities are provided.

(*d*) I think Government should give special encouragement to establish industries connected with the preparation of agricultural produce for consumption, oil pressing, rice hulling, wheat grinding, sugar refining and tobacco curing being the most important in this Province. Adequate arrangement should be made for the supply of suitable hand-power and bullock-power machines and plants to cultivators through co-operative societies, and long-term loans for the purpose should be made available at a specially low rate of interest. Where there are no co-operative societies, the scope of the State Aid to Industries Act may be extended and the machines distributed on the hire-purchase system.

(*e*) Yes, but this is not desirable.

(*f*) Yes, this is very necessary. Such industries as blacksmithy and bell-metal work could be put on a more satisfactory basis by the introduction of improved tools and appliances and organising their commercial and financial side. This cannot be done without a great deal of intensive study and research.

(*g*) The best way is to encourage and push irrigation projects. The construction of *bunds* and wells and the excavation of tanks would absorb a lot of superfluous labour. By educating the people to a higher standard of life, and creating a demand for *pucca* houses and more furniture, the more well-to-do could provide more employment for others.

(*h*) The organisation of boy-scout troops by village school masters and utilising them for village service to serve as examples to their elders, coupled with effective propaganda and lectures on subjects relating to sanitation and water supply, are practical means to this end.

QUESTION 19—FORESTS.—(*d*) Indiscriminate destruction of forests in Chota Nagpur has been going on for some time. This is due to the fact that the respective rights of the zamindars and the ryots are not clearly defined. Though the forests belong to the zamindars, the law has given the right to the ryots to cut wood for fuel and building purposes. But there is no way of preventing the ryots cutting more than their actual requirements because, whenever they are caught, they can always say they have cut it for their own or some neighbour's use. There is thus a race between the zamindar and cultivators as to who can cut away the trees faster. It is necessary to define the rights in unambiguous terms. This would go a great way towards preventing rapid deforestation in Chota Nagpur.

QUESTION 22—CO-OPERATION.—(*a*) (i) Government should take a leading part in helping the rapid development of the co-operative

movement along sound and progressive lines. This may be done in two ways.

(A) By helping the reconstitution of existing societies on a broader basis with a very much larger scope of usefulness than they serve at present.

This point is of the utmost importance and requires elucidation. It must be acknowledged frankly that co-operation has not hitherto proved, in our hands, to be a vital factor for the moral and economic improvement of the people. But this, in my opinion, is entirely due to the fact that the possibilities of the movement, as a factor in rural reconstruction, had not been realised and the organisation was allowed to grow up with too narrow an objective. Our societies hitherto have deliberately had no other object but to cater for the financial needs of the most indebted class. These classes were generally, from the point of view of intelligence and education, the most backward in the village and consequently least able to appreciate the higher principles of co-operation. The societies naturally became mere loan institutions and fairly bad ones at that. It was forgotten that co-operation had a message for all, and that by keeping out the more intelligent and enterprising and morally elevated sections of the village population, the societies were merely crippling their own moral and intellectual resources. It was not realised how greatly the economic problem was connected with the moral. The fact is that the rural problem is one comprehensive whole and cannot be attacked piecemeal. Poverty and ignorance are symptoms of the same disease. The fact is that the people are suffering from a great poverty of soul, a great want of character. Their lives are selfish and circumscribed in the extreme and characterised by an utter lack of co-operation; they are not stirred by any common aim or purpose in life; they fight over small things and go to court on the slightest provocation. They carry on litigation from father to son. The community in the village exists only in name. What we have is a disunited set of individuals with "each one for himself and the devil take the hindmost" as their only motto in life. In the circumstances, it cannot be any source of wonder, either, that their main industry, agriculture, should have fallen to such a low pitch or that the educational and sanitary needs of the village should have been so badly neglected as they are. No reform is possible without re-creating the rural community and evolving a true social organism in the village. But if all this is true, it is also true that it is precisely this situation that the co-operative movement has the power to meet. Its potency is, in my opinion, more than equal to such a task. The chief function of the co-operative movement must be moral and educational. The co-operative system, rightly conceived, must be a great system of adult education, and the societies must function as a practical school for adults where just the kind of education and training they want would be carried on by demonstration and propaganda. It follows, therefore, that a successful co-operative society must aim at organising the whole village. There can be no co-operative progress without the help of all whose co-operation is worth anything. The best minds of the village must be mobilised for an united effort at progress. Then only would it be possible to introduce agricultural improvements and find employment for the idle hours, then only would it be possible to find a solution for the education and sanitary needs of the village. This view was accepted by the co-operative congress held at Siwan as a result of a paper read by the writer on "The Future of Co-operation".* It was resolved that the

* Not re-printed.

objects of the society to be included in the model bye-laws were to be revised as noted below. These objects may be commended for adoption in all other Provinces.

The object of the co-operative society is to bring about the moral and economic welfare of the members by means of common counsel and joint efforts, and with this end in view it should do any or all of the following things:—

(1) Endeavour to effect agricultural improvements of all kinds: by arranging for better seeds, manures and implements, by introducing more remunerative crops wherever possible, by improving facilities for irrigation, by improving the breed of cattle, and in every other possible way.

(2) Endeavour to find profitable employment for the idle hour by providing facilities for learning cottage industries like spinning, weaving, silk-rearing, knitting, dyeing, tanning, carpentry, and in other ways.

(3) Encourage thrift and the habit of saving by insisting on small monthly deposits and on frugality on all occasions of festivity and general prosperity.

(4) Establish schools by raising subscriptions, donations, securing grants-in-aid or in other ways, where none exist; or improve existing ones by increasing the attendance of pupils and improving the quality of teachers and the teaching.

(5) Improve village sanitation and the health of the members and their cattle by providing better drinking water, arranging for medical aid, for the prevention of epidemics and for existence on more healthful lines.

(6) To settle disputes by arbitration and enforce the decision of the arbitrator on the disputants by fines, suspensions, explusion or other suitable measures.

(7) Create among the members a spirit of service, of mutual help and toleration among all castes and creeds by utilising all occasions when help and services are needed, by undertaking joint works for common village needs such as the excavation of a tank or a well for drinking water, or the construction or improvement of a village road.

(8) Organise village amusements by arranging for healthy sports, recital of stories and contemporary news by educated friends, magic lantern lecturers and the like.

(9) Create funds by offering the joint and several liability of the members as security in order to utilise such funds in loans to members for productive and necessary purposes or to give effect to any of the foregoing objects.

It will be seen, from these objects, that they are all-comprehensive. But it is not enough to define the aims and ideals of the movement. We must devise the best methods for their attainment. This brings me to the point with which this particular query in the Questionnaire is concerned and the answer given at the beginning, *viz.*, that Government must come forward to help in the reconstitution of existing societies along the lines indicated above.

Two essential conditions are necessary for the achievement of this end:

(*a*) The first and foremost necessity for this is a permanent institution for providing specialised training to workers in just the kind of work that is needed to enable co-operative societies to fulfil

the objects defined above. Each of the Development departments, Education, Industries, Co-operative, Forest, Public Health, should co-operate in making the institution worthy of its high object. It will, of course, be placed under the Co-operative Department, for the fundamental basis of the training must be how to teach the agriculturists to apply the co-operative method in all matters relating to their development. The entire cost of the institution should be borne by Government. Government aid for such a purpose is more than justifiable. I have very good authority for this view: at the conference on agricultural co-operation held at Wembley in 1924 Sir Daniel Hall, a leading British authority on agriculture, Chief Technical Adviser to the Ministry and Chairman of the Trustees to the Horace Plunkett Foundation, declared that it was essential from the Government's point of view that the farmers should be co-operatively organised. If that is true of other parts of the Empire, its truth is a hundred times more applicable in the case of Indian farmers. The only way to create sound co-operative societies is to employ organisers properly trained in the technique of co-operative organisaton. A resolution, the underlying principle of which was accepted at the last Co-operative Congress held at Bhagalpur on 3rd May 1927, as the result of a paper read by me, reads as follows: "The Congress is of opinion that a permanent training institution for the proper training of co-operative workers is essential to equip them adequately for their task, and consider a practical knowledge of rural economics, and of improved agricultural methods and sound co-operative practices of fundamental importance for their training. The Congress consider that it is a duty of Government to help the Federation with an adequate subsidy to establish such an institution."

(*b*) The Co-operative Federation must be subsidised by Government to supplement the staff employed by the Central Banks so that the number of societies in charge of one officer may not exceed fifteen or twenty. This is a necessary corollary of the first. If our existing organisations are to be strengthened and such a radical change as contemplated in the previous paragraph brought about in their direction and purpose, it is obvious that the men who do the work must not only have the proper technical training and qualification but they must have ample time for their work. The Central Banks employ men for every forty to forty-five societies. This staff is wholly inadequate for carrying on the educational work indicated in the objects, and, as the Central Banks cannot afford to employ a bigger staff, Government should supplement their efforts. This aid is fully justifiable. If we accept the proposition that a well ordered village organisation must be the basis of all reform, it is clear that the cheapest and quickest way to make this reform of universal application is to strengthen and re-constitute the existing co-operative societies and make their example an aid to further development on the same lines. Besides, some of the functions which the societies are to perform are primary duties of Government. For example, it is the duty of the Agricultural Department to introduce improved agricultural methods among the agriculturists, but the department has no adequate staff to work in the villages. A well organised co-operative society is the best field for demonstration of improved methods and such methods are far more likely to be copied among farmers co-operatively organised than elsewhere. If Government train co-operative workers with a view to spreading agricultural improvements and enable the movement to employ a sufficient number of such trained workers, the best methods are bound to be multiplied much faster than would be possible otherwise.

The same is true of the Industries Department. With systematic propaganda and demonstration, flyshuttle looms, warping sets, improved processes of dyeing and tanning, improved implements for blacksmiths and bell-metal workers can all be introduced through the agency of co-operative societies. In regard to these two departments, therefore, it will be seen that the societies can be utilised as centres of demonstration and can make the departments enormously more useful. As regards other departments, too, a great deal of the educational and propaganda work can be done, with immense benefit to the people and some solid results.

Take education: it is recognised that without a general spread of literary education, progress in rural areas will be slow. Government will never be able to find the money for universal primary education. But Government can at least help to educate the people up to its needs so that, if they wish and are shown the way, they may submit to voluntary taxation for the purposes. The writer's experience fully justifies the hope that every village which has a co-operative society may have a school of its own, if the villagers are educated up to its advantages and needs by a system of continuous and careful propaganda. As regards public health and sanitation there can be no doubt that hundreds of lives can be saved by the spread of knowledge as regards preventive measures against epidemics and elementary hygiene. The co-operative officer can easily carry on the educational propaganda in regard to these.

As regards the Forest Department, with proper propaganda villagers can be taught to plant good and useful trees on waste lands and prevent indiscriminate destruction of forests. In fact, there is no development department of Government which can dispense with the aid of demonstration and propaganda. Hithetor, this powerful aid to development has not been utilised, but now that there are these village agencies available, the functions of these departments will find proper scope, provided an organic connection is set up between the activities of the departments and the life of the societies. Each society should be made a centre of demonstration and propaganda. If this view is accepted and the plan approved, the principle of a Government subsidy to improve and supplement the staff through which such work is to be accomplished would need no further justification.

(B) By subsidising the Co-operative Federation for the employment of an adequate number of whole-time paid organisers who would receive a specialised course of training at the proposed training institute with a view to organising a net-work of sound co-operative societies throughout the country within a measurable distance of time. The necessity of a permanent and well ordered organisation in the village as the basis of all rural reform should be clearly recognised. The first reason, of course, is that without such an organisation any general system of rural reform would have to be centralised, would require an army of paid workers from top to bottom, and the cost involved would be so great that it would never be possible to find the money. But even if the money could be found the achievements would be very poor in comparison with what can be achieved with the intelligent co-operation of those who should be most interested in such reform. I need quote no better authority than Sir Horace Plunkett for the view that farmers must be co-operatively organised before they can be economically and effectively assisted by the State.

Hitherto, the responsibility of organising societies has been left to honorary organisers appointed by Government, more or less one

for every subdivision where the movement has not spread sufficiently. Their work on the whole, with a few exceptions, both in quality and quantity leaves very much to be desired. It is far from my intention to disparage the unselfish work of these honorary workers, many of whom have sacrificed a lot of time and energy for the cause. The want of any system for training them before appointment and the fact that most of them are recruited from the professional classes and consequently have little leisure to devote the necessary time and energy, account for most of the defects. But the facts are there. Actual progress is painfully slow, and bad organisation has handicapped work in other directions which must supplement the functions of mere loan institutions. It is easy enough to get a number of heavily indebted villagers to agree to take loans on any terms and to prepare a statement of the would-be members' assets and liabilities. But to set up a co-operative organisation in the true sense of the word is a different matter altogether. Such work is highly technical and requires not only a great deal of time and patient work but technical qualifications of a high order. Even in other parts of the Empire where the level of education and intelligence is much higher the remarkable admission was made that the chief reason why farmers do not co-operate is generally missed. It is simply that they do not know how. They have to be taught the methods of co-operation. If, therefore, the ground has to be covered within a reasonable time, and future organisation given the progressive direction indicated above, we must have whole-time organisers who would be fully equipped for their duties by a previous specialised training for a sufficiently long time.

Such organisation work should, however, be left to such central non-official bodies as the Co-operative Federation in this Province, the Bengal Co-operative Organisation Society in Bengal and the Co-operative Institute in Bombay. But the entire cost of maintaining such organisers should be met by Government.

It is important to estimate the strength of the organising staff necessary for our purposes. If it is agreed that no reform is possible except through village organisations, the first and foremost problem is how to create these organisations as fast as possible. The Province of Bihar and Orissa has 255 police-stations with an average of 333 villages in each police-station area, and taking twenty to twenty-five societies as the limit of good organisation by one organiser in one year, it would take about fourteen to sixteen years to have a co-operative society in each village if we had one organiser for every *thana*. But as it would take at least five years before a sufficient number of trained organisers could be turned out, it means that it would be quite twenty or twenty-five years before the programme is completed. Since all other progress depends on these organisations, it is clear that nothing short of one organiser for every police-station can meet the requirements of the case. The salary and emoluments suitable for such an organiser deserve some consideration. In my opinion a salary of Rs. 150, rising to Rs. 350. would attract young men of the right type to enter the training institution and compete for the test qualifying for these posts of organisers.

(ii) *District Boards.*—There should be an intimate and organic connection set up between the district boards and Central Banks because both these bodies have identical aims, *viz.*, rural development. Co-operative societies can be of the greatest assistance to the work of the district boards and the latter can give to the movement the greatest encouragement.

Mr. N. K. Roy.

This help and encouragement should take the following forms:

1. The *guru*-training schools should be re-modelled with a view to making the schools the centres of community life. If, as I have tried to stress elsewhere, a well ordered village organisation must form the basis of rural reform, it follows that the village school must form an integral part of the organic life of the village and the teacher must play one of the most important parts in this programme of development. The work of the inspecting officer of co-operative societies and that of the *guru* should be well co-ordinated so that the one may supplement the efforts of the other. The training should include the following:—

A. Proper management of co-operative societies, including, (1) the plan of development as defined in the revised bye-laws, (2) practical training in propaganda and lectures relating to the plan, (3) co-operative book-keeping and accountancy, (4) bye-laws of different types of societies and Central Banks.

B. Training as scout masters so that the teacher can organise a troop of village boys and train them in regular social service work and work relating to village improvement, thus helping to accustom the minds of the villagers to the ideal of community service. This will be one of the most important parts of the teacher's duties.

C. A course of practical agriculture in which the students would be taught (1) to appreciate the difference between the traditional and improved methods in regard to crops locally grown, (2) the technique of the field operations relating to remunerative crops which are new to the area but which may be suitably introduced.

D. A course of practical training in some common handicraft like weaving, dyeing, printing and tanning.

E. A training which would enable the teacher, (1) to communicate the scientific interest provided by the farmers' physical environment to the agricultural classes according to their capacities, (2) to engender a love of nature in the rural mind. Sir Horace Plunkett and Dr. George Russell (A.E.), both great authorities on rural organisation, lay great stress on this aspect of rural education and there can be no doubt of its importance for villages in India.

2. The district board should grant, for co-operative development, an annual subvention to the Co-operative Federation equal to a fixed percentage of their revenues. A part of such grants may be earmarked for such objects as the board may be specially interested in *e.g.*, (*a*) preparation of special slides for lantern lectures on the advantage of starting schools by co-operative efforts, on preventive measures against epidemics and matters relating to hygiene and sanitation, (*b*) making grants for experiments in special type societies: cattle breeding, cattle insurance, irrigation and the like.

3. Loans may be granted to Central Banks for long terms from the unspent balances of district boards at a low rate of interest and earmarked for such purposes as well-digging, excavation of tanks, construction of grain *golas*, purchase and sale societies and for schemes of debt redemption, all of which require a long period of repayment and a low rate of interest.

4. The district board may adopt a favoured-village policy by which:—

A. Schools in villages where there are societies would be improved up to the desired standard.

B. New schools would only be started in villages where there are co-operative societies and where the members have given proof of their keenness for education by raising a part of the *guru's* salary or helping by their labour in the construction of the school buildings.

C. Contracts for wells, roads and school buildings should be given wherever feasible to the nearest co-operative society.

5. The district board should co-operate with municipalities in encouraging co-operative dairy farms and milk unions by providing transport facilities for fodder and dairy produce from the villages to the cities.

Municipalities.—These bodies can encourage the growth of the co-operative stores movement by making grants for buildings and sites for such stores.

The municipalities can also encourage co-operative milk unions and dairy farms by (*a*) opening depots for the sale of milk and fodder for the cow-owners in the towns and (*b*) co-operating with the district boards in providing transport facilities for fodder and dairy produce.

(*b*) (i) I do not think that the type of societies which we have at present, *viz.*, those that serve the purpose of mere loan institutions, are worth multiplying. Without an educational campaign of the nature described, the credit societies would be of little use in the ultimate economic salvation of the people. But once properly organised, the societies should be allowed loans at a rate of interest considerably lower than they receive at present. The rate chargeable to the members should not exceed eight per cent and this would only be possible if the surpluses of the Imperial Bank were made available to the Provincial Co-operative Bank at a rate of interest not exceeding three per cent.

(viii) Such societies should receive special encouragement, as the condition of cattle in the country is most deplorable. This encouragement should take the following forms:

1. A breeding bull may be supplied free to such societies when organised.
2. Grants should be made by Government and district boards for cattle shows and liberal prizes offered for the best conditioned animals bred from such sires.

(ii) to (ix) As regards all other types of societies, my suggestion is that they should be created after the village society has been fully established and their need felt by the members themselves. But I think separate societies for distinct purposes would only be necessary in very big villages. In an average sized village, the "general purposes" society described in my note would serve most of the purposes, particular groups of members combining for particular objects.

(C) Yes, I think legislation should be introduced in order to compel an unwilling minority either to join societies for joint improvement or to accept a reasonable compensation to be decided by the Assistant Registrar or any other competent authority.

QUESTION 23.—GENERAL EDUCATION.—(*a*) (ii) Middle schools and elementary schools should both be remodelled to serve the purpose of

community centres and should be related to the life of the village. The teachers should receive a previous specialised training in practical agriculture, in the true principles of co-operation and the proper management of a co-operative society. This training should enable the teacher to give great assistance to the local organiser and co-operative worker in forming a society in the village on the lines suggested in a previous answer. When the society has been started, it will become a centre for the dissemination of the highest truths relating to agricultural science, and the children would be trained in practical social service through the organisation of local boy-scout troops, and would of course be made to take an interest in the activities of the local society and the method of its management. A love of nature must be created and the pupils taught, according to their capacities, to take a scientific interest in everything round about them. Only in this way will the rural mind be set free from its present stagnation.

(*b*) (i) When the societies are properly organised and trained in the art of common counsel and common efforts, these intellectual exercises and the community life will form the basis of a fine culture and constitute a valuable lesson in true citizenship. They will, at the same time, improve the efficiency of the school.

Such things as the scientific selection of seed, experiments in new fertilisers, fodder tests, efforts to combat a cattle epidemic or crop pest in a scientific way, followed by discussions regarding their effects, would add interest and zest to the life of the agriculturists.

(ii) My experience is that it would not be necessary to have recourse to any compulsion in the matter of education, provided sufficient propaganda as regards the advantages of education is carried on.

(iii) This is chiefly due to the inefficiency of the teacher and want of local supervision over his work. In most cases, the teacher is a great absentee and, owing to low pay and the want of adequate control, takes very little interest in his work. The remedy is better training, more salary for the teacher and local control.

QUESTION 25.—WELFARE OF RURAL POPULATION.—(*b*) Yes, this would be very useful, and should take the form suggested by Prof. Burnett-Hurst in the report of the Economic Enquiry Committee.

QUESTION 26.—STATISTICS.—(*a*) (iii) There is a quinquennial census regarding this and the methods adopted are defective. I would suggest that an accurate census of livestock should be taken at the same time as the ordinary census. The same organisation might easily do this additional enumeration and this would involve very little addition to the cost. If a quinquennial census is considered necessary, the best thing would be to time the next one five years before before the next ordinary census would be due, and employ an organisation similar to that employed during the ordinary census.

Oral Evidence.

68,353. *The Chairman*: Mr. N. K. Roy, you are Assistant Registrar of Co-operative Societies, Ranchi Circle?—I was; I have now been appointed Deputy Registrar.

68,354. Would you agree that the condition of the primary societies in the Province as a whole is far from satisfactory?—Yes; I agree.

68,355. Would you agree that until that position is remedied the best effects of co-operation cannot be looked for?—Yes.

68,356. Would you agree that the first step which should be taken by your department is to vivify, and render thoroughly sound, the primary societies and to educate members of the primary societies in co-operative principles?—Yes; I have made elaborate proposals regarding that in my note.

68,357. *Professor Gangulee*: Could you give us any reasons why the village organisation societies, which are alive and working in the Khunti sub-division, are not flourishing in other parts of the Province?—First of all, this is a new movement; the plan of development along these lines is a new idea. Only recently the Congress has accepted this kind of work. Moreover, we want trained workers to enable the Central Banks to function as organisers. Without trained organisers we cannot have more of such societies. That is why I propose that we must have a training institution to train co-operative workers on the principles of co-operation.

68,358. And you hope that this movement started in the Khunti sub-division will spread over the whole Province if you have trained workers?—Yes. We must have trained workers; that is very important. But unless the Co-operative Federation is subsidised adequately to maintain a sufficient number of trained workers it will not be possible to have such societies. Provided we get the men, it will be possible to start such whole-village organisations.

68,359. In the first place, you must have workers willing to do the work?—Yes.

68,360. In the second place, you must give them training?—Yes.

68,361. Have you enough men to take up the work?—Yes.

68,362. Where would you train them?—My idea is that we must have an institution, either at Sabour or at Patna, to give them just the training which would fit them for the work of village reform, and that all the development departments should co-operate with the institution and make the institution worthy of its objective.

68,363. Who is going to bear the cost of the training?—In my scheme I propose that Government should bear the cost; but so far as the training institution is concerned a further idea has occurred to me, namely that if we get ten per cent of the net profits of the Central Banks and five per cent of the net profits of the societies, we can meet half the cost of the institution.

68,364. We have been told, in the evidence before us, that the co-operative movement in Bihar and Orissa has begun to show signs of deterioration in the primary societies; could you tell the Commission the reasons for this deterioration?—The reason is that cultivators have not been taught progressive methods in agriculture; they have simply been enabled to redeem a portion of their past debts. If only they were taught how to improve agriculture, the societies would immediately get more life than they have at present.

68,365. You do not think that lack of supervision is one of the reasons?—I do; there is lack of trained supervision. I mean that the persons in charge of co-operative societies should know enough about agriculture to induce the cultivators to adopt improved methods of cultivation.

68,366. Can you tell us whether the Central Banks are mainly concerned with the interest of the primary societies or the interest of the depositors?—That is a very difficult question to answer; but I think the Central Banks are doing a lot of good work at present.

Mr. N. K. Roy.

68,367. It is stated that your primary societies are too much under the control of the Central Banks; is that a fact?—No. I do not think we can dispense with the supervision of the Central Banks at present, because the members of the primary societies are not educated enough to be able to exercise mutual control. That pre-supposes a level of education which they have not at present. There are only two or three men at the top who are educated, and the others are all so backward that, if the societies were left to themselves, there would be much more domination practised over them by the panchayats than is at present practised by the Central Banks.

68,368. What is your relation with the Department of Agriculture? Do you get much assistance from them?—I cannot say that we have had enough assistance in the past; but that is because we have not yet come to the point where we have an agreed policy. I mean to say that if the Co-operative Department regarded the introduction of improved methods of agriculture as part of their duties and the Agricultural Department was willing to train workers for this work, we would get on much faster than we are doing.

68,369. Could you tell us of your relationship with the Department of Education? Do you get any assistance from them?—Up to the present we have had no relationship with the Department of Education. We have tried to introduce new schools by propaganda, and the district boards have given us as much help as is required.

68,370. With the Department of Public Health?—No; we have not had any organic connection; but we have tried to do some propaganda in connection with cholera.

68,371. You do not receive any assistance from the Public Health Department in your propaganda work?—The whole trouble is that we have not got any defined policy. If the Public Health Department would go into the training institution and train co-operative workers to do propaganda work in regard to preventive measures against diseases we could do a lot.

68,372. In your propaganda work, do you use the posters published by the Department of Public Health?—Posters are absolutely of no use.

68,373. Why?—Because there is nobody to read them.

68,374. Which part of the Province do you know best?—I know Chota Nagpur very well, and I know parts of Bihar and Orissa.

68,375. Are you familiar with the local bodies in those tracts?—I am familiar with the local bodies of Chota Nagpur.

68,376. What is the position of communications in the areas that you know?—Communications are very good in Chota Nagpur.

68,377. *Mr. Kamat*: As regards the training through the Federation, the Federation is receiving a subsidy at the present moment?—Yes, it is receiving a very small subsidy.

68,378. We were told that it was about Rs. 7,500?—Yes, it is about that, but I consider it is too small.

68,379. Did you make any proposal to Government that you would undertake to train workers, and on that ground did you ask for an enhancement of the subsidy?—No, it is not my business to ask for it. My point is that the training should not be the business of the Co-operative Department alone. I consider that all the Development departments should be equally interested in this training, because the Central Banks provide the men and the local supervision. If only

the training were given by all the Development departments, they could make their departments enormously more useful.

68,380. You admitted that the whole crux of the question and the weakness of the co-operative movement was in the lack of training?—Yes. That is the main theme of my written memorandum.

68,381. It must be somebody's business to bring these facts to the notice of the Local Government and to ask for a remedy. I ask you, who proposed to have this subsidy, or, if none proposed it, why did they sleep over it?—It has been proposed by me in the last Co-operative Congress; it has been accepted by the Congress, and steps are now being taken to move the Government in the matter.

68,382. As regards your proposal to convert a whole village into a village welfare society, what are your views on the idea of a multiple purpose society?—I would not call it a multiple purpose society. If you will refer to the objects, you will see that there are no different purposes in it. For example, I do not include a sale society in my objects at all; I would not include a co-operative store in my objects at all. What I do include among the objects is the improvement of agriculture; they should meet together and discuss what kind of crops will give them the best return, and that is a kind of thing which they do not do at all at present. The co-operative workers have hitherto considered that this is outside the scope of a co-operative society, but if they could only change that attitude a great deal more could be done.

68,383. *Mr. Calvert*: What, did you say, was considered outside the scope of a co-operative society?—The introduction of agricultural improvements.

68,384. *Professor Gangulee*: Did you ever have an opportunity of seeing the before-farming societies of the Punjab?—I am not familiar with them, but I have read about them.

68,385. *Mr. Kamat*: You have been emphasising that the improvement of agricultural practices is the main point, and that unless you have that you cannot gain the confidence of the co-operators?—Quite so.

68,386. What are the boundaries? Where does the proper function of the Agricultural Department end and yours begin?—There should be really no boundary, so far as I am concerned.

68,387. Take the question of improved seed. When they have demonstrated that a certain type of seed is an improved variety, what further help do you want?—I say that they have not yet demonstrated it to the satisfaction of the ryots. They have only demonstrated it in the central farms, but so far as carrying on the demonstration in the ryots' own fields is concerned, we have not yet done anything appreciable.

68,388. You have said something about seed distribution. I take it that you would be prepared to carry on propaganda and to work up through your movement to seed distribution?—Yes, provided I get the men trained for this kind of work. The man must know something about the matter, to be at all able to do propaganda work, and that is why training is so very important.

68,389. That is your part of the work?—No. I think the Agricultural Department should train our workers to do propaganda work in regard to improvements recommended by them. It is for that reason that I consider a combined, institution on behalf of the development departments to train co-operative workers so necessary because they are the only men who work in the villages at present.

68,390. I am not quite sure whether things are not being mixed up. You are saying that there are no trained workers. By 'trained' I take it that you mean trained in the ordinary principles of co-operation?—No. My whole point is that co-operative workers must be trained in improved agricultural methods, or in any improvement, in fact, which is suitable for adoption in the villages, and that training must be given in a central institution. It is for the experts to decide what, exactly, the lines of the training should be. We say:—"Here are the men working in the villages. Give them the training". In that way, by applying co-operative principles, improved methods could be introduced very easily.

68,391. Do you seriously maintain that the Agricultural Department has failed to prove the merit of certain improved seed varieties, and that therefore you are not willing to take up seed distribution?—I do not suggest that at all. What I mean to say is that it has not yet come to the ryots' knowledge. We have no link between the central farm and the ryot. There must be a body of workers who would be prepared continually to advocate the improved methods, so that one or two persons in every village may take it up as a sort of demonstration.

68,392. In other words, the propaganda of the Agricultural Department is weak?—There is, in fact, no propaganda; I would say it is absolutely *nil*.

68,393. That means that they have been experimenting, but they have no agency for propaganda work?—Yes, and that is true also of the Public Health Department and the Industries Department; they have got no propaganda agency in the villages.

68,394. You spoke about the lack of an agreed policy between you and the Agricultural Department. Why cannot you come to an agreed policy?—It is a question of difference of opinion as to what really is the best thing to do.

68,395. *Professor Gangulee*: Both the departments are under a common Minister?—Yes, they are under a common Minister.

68,396. *Mr. Kamat*: In plain language, do I take it that the two departments are at loggerheads?—I do not think so. It is only a question of the method of extending the improvement. I think the opinion of the head of the Agricultural Department is that co-operative workers might make mistakes and that they would not be sufficiently trained to do the work, and on that account might hinder progress. That is why I consider an adequate training in improved agricultural practices, of all co-operative workers, so very essential for progress.

68,397. *Sir Thomas Middleton*: You mean to say that a man might be a very good co-operator, but a very bad farmer?—I do not want him to be an actual practical farmer. I want him to know sufficient about improved methods. Take, for instance, the *rahat* pump. If I want a man to introduce it, then he must have seen the *rahat* pump at work and know what its advantages are before he can do propaganda work in regard to it. There is not a single man doing this work on behalf of the Agricultural Department. I say that our co-operative workers are in a position to do this work if they only had the training.

68,398. Your complaint is that no training is given in agriculture by the Agricultural Department?—Yes.

68,399. You are providing some funds for training?—The movement is providing half the amount, and my suggestion is that the other half should be obtained by a subsidy from Government.

68,400. *Mr. Calvert*: I gather from your very enthusiastic note that there is nothing like co-operation?—That is my view.

68,401. Another witness has told us that "not every one by any means realises that co-operative societies are business institutions, and must be run on business lines." Would that apply to the workers in the field?—Yes, I believe it does.

68,402. Is there a general failure to understand that co-operation must be run on business lines?—I agree. This is due to lack of adequate facilities for technical training in the principles and methods of co-operation.

68,403. *Professor Gangulee*: In the note of evidence of another witness it is said: "From my long experience of the co-operative workers, I can say that by placing the societies under the guidance and supervision of the Central Banks, these have been much demoralised, and not much has been achieved towards the well-being and prosperity of the rural population." Do you agree with that view?—I am prepared to agree to that, with this proviso, that if proper training were given the defect would disappear.

(The witness withdrew.)

The Commission then adjourned, till 10 a.m. on Thursday the 1st December, 1927, at Delhi.

APPENDIX.

Cost of production of sugar cane to European planters in North Bihar.

	Rs.	A.	P.
1. Cost of seed, 50 maunds @ 0-6-0	18	12	0
2. Rent (2 years) per acre	20	0	0
3. Cost of cultivation	15	8	0
4. Manure, 15 maunds oil cake @ 2-8-0	37	8	0
5. Supervision by Indian servants	8	0	0
Total Cost per acre	99	12	0

Average return per acre 350 maunds.

Value of 350 maunds @ 0-6-0	131	4	0
Profit per acre	31	8	0

N.B.—The crop is in the ground two years so this represents the profit per acre for two years.

Cost of production of sugar cane to a Ryot in North Bihar.

	Rs.	A.	P.
1. Cost of seed, 50 maunds @ 0-6-0	18	12	0
2. Rent (2 years) per acre	10	0	0
3. Cost of cultivation	8	0	0
4. Manure	*Nil.*		
5. Supervision	*Nil.*		
Total cost per acre	36	12	0

Average return per acre, 150 maunds.

Value of 150 maunds @ 0-6-0	56	10	0
Profit per acre	19	14	0

N.B.—The crop is in the ground two years so this represents the profit per acre for two years.

Capital cost of a 200 acre farm in North Bihar.

	Rs.	A.	P.
1. Purchase price at Rs. 200 to Rs. 350 per acre=	40,000	0	0
	to		
	70,000	0	0
2. Cost to put in order, Rs. 15 per acre . .	3,000	0	0
3. Purchases of 15 pairs bullocks @ Rs. 200 .	3,000	0	0
4. Cost of implements	500	0	0
5. Cost of farm buildings, bullock houses, granaries, etc.	1,000	0	0
6. Working capital for manures, wages, etc. .	3,000	0	0
Total Rs. .	50,500	0	0
	to		
	80,500	0	0

GIPD—L21 CP—26-4-28—2,500.

INDEX

(Figures in brackets refer to pages, other figures to questions)

ADMINISTRATION :

Agricultural Adviser, proposed status of, *Dobbs* (111-3).
Board of Agriculture, wide constitution proposed, *Dobbs* (112).

BOARDS OF AGRICULTURE :

Central :
for Co-ordination, *Sinha, D. P.* (198-9).
Finance : tax on agricultural exports recommended, *Sinha, D. P.* (199) 66527-30.
Higher appointments should be controlled by, *Sinha, D. P.* (202) 66491.
Provincial : Re-organisation recommended, *Sinha, D. P.* (199).
Central organisation of scientific and technical consultants advocated, *Dobbs* (56-7).
Chamber of Agriculture, all-India, central, recommended, *Khan* (441).
Court fees, etc., increase of, deprecated, *Arikshan Sinha* (272).
Development Board, meets 3 or 4 times a year, *Dobbs*, 65651-5.
Development Officer should control Veterinary, Agricultural and Co-operative departments, *Heycock* (222) 66583-7, 66662.
District Boards : Veterinary control, *Quinlan* (120-1) (126), 65772-9, 65858-9, 65906-13, 66005-115. *See under* " DISPENSARIES " *under* **VETERINARY.**
of Education, *see under that main heading.*
Experts, scientific, should be controlled by scientific officers of calibre of Fellows of the Royal Society, *Dobbs* (57) 65401 (110-3) 65470-4, 65475-6.
General administrative officer required, *Dobbs* (58).
Government policy criticised, *Arikshan Sinha* (256-7) (272-3) 66822.
Imperial research, institute (like Pusa) should co-ordinate Provincial research, *Ganga Vishnu* (37) 65278-9.
Lac association, *Dobbs*, 65495-500. (*See also under* **AGRICULTURAL INDUSTRIES** *and* **NORRIS.**)
Local self-government, *Heycock*, 66749-56 .
Meteorological Department : Seasonal instead of annual basis suggested, *Roy, S. K.* (459).
Organisation, all-India, for improving agriculture in general, *Dobbs*, 65495-500.
Partition of Bengal, effect on Agricultural Department of, *Dobbs*, 65682-9.

POSTS AND TELEGRAPHS :

Increased cost deprecated, *Arikshan Sinha* (272).
Marketing information should be exhibited to cultivators at offices, *Sethi* (352-3), 67517-8.
Provincial Development Board recommended, *Sinha, D. P.* (208) 66486-8.

PUSA RESEARCH INSTITUTE :

Agricultural Department's staff should visit, *Sethi* (352) 67514-6.
Bullocks bred at, *Meyrick*, 68096-9.
Cattle breeding, successful work, *Khan* (449).
Cattle sales, *Ganga Vishnu*, 65301-2.
Climate, not suitable for post-graduate training, *Dobbs*, 65384-9.
Control of provincial departments by, recommended, *Khan* (443-4) 68210.
Experts from, should take the place of provincial experts, *Khan* (443).
Gangetic alluvium, importance of, *Dobbs* (113).
should do Local demonstration and propaganda work, *Atkins*, 65148-53, 65161.
Officers not sent to, *Dobbs*, 65635-6.
Post-graduate study at :
Bangalore preferable, *Dobbs*, 65384-9 (116-7).
Recommended, *Sinha, D. P.* (200).
Provincial Agricultural Department's work partly done by, *Meyrick*, 68084-9.
Provincial work, *Dobbs* (57) 65592-4, 65402-10, *Ganga Vishnu* (38) 65269, 65295-300.
Research side should be emphasized, *Dobbs*, 65569-70.
Staff should be increased, *Khan* (444).

ADMINISTRATION—contd.

PUSA RESEARCH INSTITUTE—*contd.*

Work on sugar, *see under* **CROPS AND CROP PROTECTION.**
Suggestions as to, *Meyrick*, 68032, 68094-5, 68144-6.
a Waste of public money, *Arikshan Sinha* (257-8) (264) (267) 66803-16, 66855-8.
Work on Wheats, *see under* **CROPS AND CROP PROTECTION.**
Reforms :
Effect of upon agriculture, *Tuckey*, 66890-1.
have Increased difficulties of improving livestock, *Quinlan* (126) 65726, 66008.
Retrenchment recommended, *Narendra* (409) 67861-9, 67889-94.
Taxation of poor people excessive, *Arikshan Sinha* (272). (*See also* **TARIFFS AND SEA FREIGHTS.**)

TRANSPORT :

Bridges, lack of, *Sinha, D. P.* (202).
Communications :
Bad, *Prasad*, 66400.
Co-operative movement, expansion of not handicapped by bad communications, *Prasad*, 66400.
in Chota Nagpur very good, *Roy, N. K.*, 68374-6.
District boards willing to spend money on, *Heycock*, 66750, 66755-6, 66799.
Forests, communications necessary to enable agriculturists to make full use of, *Lyall*, 67896-7.
Marketing hampered by lack of, *Sethi* (352).
Employment, rural, might be increased by improved transport facilities, *Sinha, D. P.* (206).
Marketing, as affected by : *see* TRANSPORT *under* **MARKETING.**
Motor, goods services recommended, *Ghose* (377).
Railways :
Coal, special facilities for carrying of, to prevent use of cowdung as fuel, recommended, *Ghose* (383), *Roy, N. K.* (487).
Corruption : appalling, *Atkins* (17).
Complaints ignored, 65109-16.
Distance from station, difficulty of, *Arikshan Sinha* (270).
Employment on, as a subsidiary industry, *Sinha, D. P.* (205).
Feeder lines, extension advocated, *Henry* (2) (5).
Fodder :
Facilities necessary, *Ghose* (386).
Reduced flat rate for 500 miles suggested, *Roy, N. K.* (488) (490).
Free travelling facilities for surplus labour recommended, *Ghose* (388).
Freights should be reduced, *Roy, S. K.* (459) (463).
Freights for agricultural requisites should be reduced, *Khan* (444).
Fruit, difficulty of distance from, *Arikshan Sinha* (270).
Livestock, reduction of freights recommended, *Roy, N. K.* (487).
Passenger trains lose time, *Dobbs* (58).
Perishable produce, prompt dispatch necessary, *Arikshan Sinha* (260-1).
Pilfering excessive, *Dobbs* (58) 65554-5.
Roster system does not work, *Atkins*, 65195-6.
not Satisfactory, *Dobbs* (58), *Arikshan Sinha* (260-1).
Wagons, distribution haphazard, *Atkins* (17).
Roads :
Agricultural Department should be consulted as to, *Ghose* (377).
Agricultural development hampered by, *Sinha, D. P.* (202).
Bullock carts excluded from part of the road in some areas, *Heycock*, 66795-6. (*See* Main Roads *below*).
Central road board recommended, *Ghose* (377) 67690-1.
Cess :
District boards receive, *Heycock*, 66797-8. (*See* Tax *below*).
Village roads, larger proportion of, should be spent on, *Atkins* (18) 65179-82.
Condition disgracefully bad, *Atkins* (17-18).
not Deteriorating, *Ghose*, 67829-31.
Extension advocated, *Henry* (2) (5).
Fodder, better transport facilities necessary, *Roy, N. K.* (488) (490).
Irrigation : roads can be utilised as embankments for storing water, *Ghose* (377).

ADMINISTRATION—contd.

TRANSPORT—*contd.*

Roads—*contd.*

Main roads :
District boards control, *Atkins* (18) 65118-26, 65141-7.
Exclusion of cultivators' cart from better portion, *Atkins* (18) 65117-26, 65254, *Heycock*, 66795-6.
Extortion by district board peons, *Atkins* (18).
Maintenance should be better, *Dobbs* (58); fairly good, *Henry*, 64953-6.
Marketing hampered by lack of, *Sinha, D. P.* (202).
Metal, very little, *Henry*, 64953-6.
Milk collection, good roads essential for, *Quinlan* (126).
More required for marketing, *Ghose* (377) 67688-9.
Perishable produce, prompt despatch necessary, *Arikshan Sinha* (260-1).
Private estates, roads through, maintained by district boards, *Atkins*, 65141-7.
Public Works Department should control more inter-district roads, *Roy, S. K.* (459).
Rural, for cart traffic necessary, *Khan* (444).
Tax : (*See also* Cess *above*).
on Bullock carts and should be earmarked for roads, suggestion, *Heycock*, 66780-1, 66793-6.
Provincial suggested, *Heycock*, 66785-92.
Village roads :
Cess, larger proportion should be spent on, *Atkins* (18) 65179-82.
Neglect of by district boards, *Prasad* (161) 66459-60.
Steamers : (*See also under* **TARIFFS AND SEA FREIGHTS.**)
Freights should be reduced, *Roy, S. K.* (459).
Freights for agricultural requisites should be reduced, *Khan* (444) (451).
Subsidiary industries : transport difficulty, *Sinha, D. P.* (206).
Tramways :
Extension advocated, *Henry* (3) (5).
Private, attitude of local authorities to, *Henry* (2) (5) 64936-41.
Prohibitive terms, *Henry* (2) (5) 64938-40.
Union boards recommended, *Phillips* (336-7).

ADULTERATION, *see under* **MARKETING.**

AGRICULTURAL ASSOCIATIONS, *see under* **DEMONSTRATION AND PROPAGANDA.**

AGRICULTURAL DEPARTMENT (*see also under* **DEMONSTRATION AND PROPAGANDA**).

Agricultural associations, control by Department, recommended, *Khan* (443).

Assistant Directors :

Qualification : B.Sc. with Honours, *Dobbs*, 65564-5, 65674-81 (114-7).
farm Training, *Dobbs*, 65463-6, 65519, 65587-94, 65674-81.
Botanical Section : should be transferred from Sabour to Patna, *Dobbs* (49) (114-6).
Botanist : failure to fill the post, a retrograde policy, *Heycock* (219). (*See* Economic Botanist *below*).
Cattle farms, *Quinlan*, 65764-6.
Chemical Section :
Expenditure, considerable increase, not advocated, *Dobbs* (53).
should be Transferred from Sabour to Patna, *Dobbs* (49) (115).
Staff inadequate, *Dobbs* (53).
Chemist : failure to fill the post, a retrograde policy, *Heycock* (219).
Civil administration : in touch with, *Dobbs*, 65623-5.
Co-operation, *see* AGRICULTURAL DEPARTMENT *under* **CO-OPERATION.**
Cultivators, insufficient touch with, *Dobbs*, 65623-5.
Deputy Directors, Duties of, *Sethi*, 67569-80.
Development Officer should control Veterinary, Agricultural and Co-operative departments, *Heycock* (222) 66583-7, 66662.

AGRICULTURAL DEPARTMENT—contd.

DIRECTOR OF AGRICULTURE :

Appointment of outsider suggested, *Dobbs* (50-1) 65379-82.
Statistics, is in charge of, *Dobbs*, 65708-16.
Economic Botanist :
Appointment might be abolished, *Dobbs* (115).
should be Replaced by Plant breeding specialist, *Sethi* (356).
Expansion :
Urgently necessary, *Sethi* (349).
too Slow, *Heycock* (219).
Expenditure, inelasticity of rules, *Sinha, D. P.* (198) (202) 66486-8.
Experiments by, have led to great improvement, *Khan* (443).
Extension recommended, *Arikshan Sinha* (260).
Farms, *see under* **DEMONSTRATION AND PROPAGANDA** *and* **EDUCATION.**
Finance, *Dobbs* (50) ; inadequate, *Khan* (444).
Forestry Department, question of co-operation with, has not arisen, *Dobbs*, 65445.
Functions, *Heycock*, 66693.
Irrigation, special section recommended, *Roy, S. K.* (462).
Legislative Council : hostile attitude of, *Dobbs*, 65682-9.
Marketing of produce, with assistance of co-operative societies, recommended, *Heycock* (219).
North Bihar, practically not touched, *Dobbs*, 65702-7.
Organisation, *Dobbs* (49-53).
Partition of Bengal, effect on, of, *Dobbs*, 65682-9.
Policy in some respects retrograde, *Heycock* (219) 66740.
Profits resulting from improved implements and materials should be examined, *Narendra* (408).
Province, limitation of appointments to, deprecated, *Sinha, D. P.* (202) 66491-3.
Pusa doing some of the work, *Meyrick*, 68084-9.
Red tape, *Sinha, D. P.* (198) (202) 66486-8.
Representatives required, one in each thana, *Ganga Vishnu* (37) 65278-9.
Scientific work might be controlled by University, *Dobbs*, 65475-7 (114-7).

SERVICES :

does not Benefit cultivators, *Arikshan Sinha* (260).
Efficient but ineffective for lack of staff, *Henry* (2).
Inadequate, *Khan* (444).
a Paper fiction, *Ganga Vishnu*, 65269.
should be Restricted to field, steading and workshop, *Dobbs* (49).
not Satisfactory, *Narendra* (408) ; not entirely satisfactory, *Atkins* (17).
not Sufficiently useful, *Sinha, D. P.* (202).
South of Province, work in, *Heycock*, 66772-3.

STAFF :

Agricultural College to train recruits, question of, *Dobbs* (55) 65396.
Inadequate, *Henry* (2) 64934-5, *Atkins*, 65050-2, *Dobbs* (51-2) 65532-46, 65623-5, 65686-9, *Heycock* (219), *Sethi* (349) (355-6) 67603-4, 67617-21, *Ghose* (376-7), *Khan* (440).
Lower grades should be considerably increased, *Roy, S. K.* (459).
Recruitment :
Difficulty, *Dobbs* (110).
in the Province, *Dobbs*, 65563-4.
Subordinate Service, *see below.*
Sympathy with cultivators necessary, *Khan* (440).
Training : *Heycock*, 66638-42, *Sethi* (350) 67538-44, 67574-8, 67628-9.
Visits to Pusa and other Provinces recommended, *Sethi* (352) 67514-6.
Subordinate Service :
Pay, *Dobbs*, 65595.
Recruitment :
from Cultivating classes advised, *Dobbs* (56).
Difficulty, *Dobbs*, 65398.
Trained on central farms, *Dobbs*, 65596-600 (115).
Training at Sabour Farm, *Dobbs* (116).

AGRICULTURAL DEPARTMENT—concld.

Sugar Bureau at Pusa, relations with, *Dobbs*, 65661.
Sugarcane work inadequate, *Meyrick* (429) 68102-9. (*See* SUGARCANE *under* **RESEARCH**.)
Superior Provincial Agricultural Service :
training of probationary Assistant Directors, *Dobbs*, 65383-9.
Transfers of officers not too frequent, *Dobbs*, 65610.
Wells, is responsible for sinking, *Bery*, 67096-8.
Work done, *Dobbs*, 65601, 65615.

AGRICULTURAL INDEBTEDNESS.

Bengal Tenancy Act, *Lal*, 67041-3.

CAUSES OF BORROWING :

Agriculture, uncertainty of, *Dobbs* (58-9), *Sinha, D. P.* (203), *Tuckey* (282).
Calamities, *Khan* (444).
Capital, need of, *Arikshan Sinha* (261).
Cattle, loss of, *Prasad* (161-2), *Lal* (302) 67047-9, *Sethi* (353), *Ghose* (378).
Ceremonies, *Henry* (3) 65015-6, *Ganga Vishnu* (38), *Sinha, D. P.* (203), *Heycock* (220), *Arikshan Sinha* (261), *Tuckey* (282), *Lal* (302).
Cost of living, increase in, *Narendra* (408).
Cottage industries, decay of, *Tuckey* (282), *Sethi* (353).
Crop failures, *Henry* (3) 65015-6, *Lal* (302), *Ghose* (378), *Sethi* (353), *Khan* (444).
Debts old and inherited, *Sinha, D. P.* (203), *Heycock* (220).
Diseased minds of village people, *Ghose* (389-90).
Extravagance, *Atkins* (18), *Khan* (444).
Families, large, *Sinha, D. P.* (203), *Narendra* (408).
Family, joint, system, *Heycock* (220).
Holdings, uneconomic size of, *Sethi* (353).
Illiteracy, *Sethi* (353).
Improvidence, *Tuckey* (282).
Inadequate income, *Sinha, D. P.* (203).
Land purchase, *Henry* (3).
Laziness, *Sethi* (353).
Litigation, *Henry* (3) 65015-6, *Ganga Vishnu* (38), *Prasad* (161-2) 66454-7, *Sinha, D. P.* (203), *Tuckey* (282), *Lal* (302), *Ghose* (378).
Personal expenditure, increased, *Dobbs* (58-9).
Population, pressure of, *Prasad* (161-2) 66454-7.
Rent demanded in advance, *Sinha, D. P.* (203).
Social aspirations, *Sinha, D. P.* (203).
Spendthrift ways, *Ganga Vishnu* (38).
Standard of life, higher, *Ganga Vishnu* (38).
Subsidiary industries, lack of, *Tuckey* (282), *Sethi* (353).
Thriftlessness, *Atkins* (18), *Ganga Vishnu* (38), *Sethi* (353).
Unproductive expenses mainly, *Roy, S. K.* (461).
Usury, *Prasad* (161-2) 66454-7.
Yield from land, decreasing, *Narendra* (408).
Chota Nagpur Tenancy Act, sections prohibiting sale, transfer or mortgage of holdings, a failure, *Foley* (225).
Contracts relating to land or buildings, suggestions as to, *Dobbs* (59) 65695-700.
Courts should have power to go behind documents and take accounts, *Tuckey* (282).
Creditors, "close-fisted" treatment of, deprecated, *Narendra* (408).
Damdopat: *Tuckey* (280) 66906-8, 66948-9; should be adopted, *Lal* (302) 67051.
Debtors become serfs, *Tuckey* (280-1) (285-6).
Extent of :
75 per cent. of cultivators, *Henry* (3).
not very General, *Ganga Vishnu* (38) 65314-5.
Small holders largely affected, *Ganga Vishnu* (38).
Grain loans :
Interest 50 per cent, *Prasad*, 66364-8.
Preferable to cash, *Prasad* (162) 66369-70.
Insolvency, special measures to deal with, advocated, *Ganga Vishnu* (38); not necessary, *Sinha, D. P.* (204).

AGRICULTURAL INDEBTEDNESS—contd.

INTEREST :

Co-operative, *see under* **CO-OPERATION.**
Disallowance by law over 12 per cent. recommended, *Sinha, D. P.* (203-4) 66533-4.
cannot Exceed principal in Santal Parganas, *Tuckey* (280) 66906-8, 66948-9.
High, *Heycock* (220).
Legislation to reduce, suggested, *Heycock* (220) 66568-73.
Rates, *Prasad* (165) 66364-8, 66461-4, 66468-70, *Lal*, 67020-5.
Restriction recommended, *Lal* (302); to 25 per cent suggested, *Tuckey* (282).
Usury should be made penal, *Tuckey* (282).
Kist Kothis (loan offices), *Prasad* (162).
Land passing out of the hands of cultivators, *Ganga Vishnu*, 65331-3, 65368-70.
Landlords, loans by, *Lal*, 67057-60.
Landlords make grain loans which are beneficial, *Prasad* (162).
Land mortgage banks recommended, *Roy S. K.* (461) (465). *See* BANKS *under* **FINANCE.**
Legislation not recommended, *Ghose* (379).

MEASURES FOR LIGHTENING AGRICULTURE'S BURDEN OF DEBT :

Banks, agricultural, *Sinha, D. P.* (204), co-operative, *Tuckey* (282-3).
Compulsory repayment at threshing time, *Lal* (302).
Co-operation :
only, *Prasad* (162).
the only Practical method, *Heycock* (220).
Co-operative banks, *Tuckey* (282-3).
Damdopat, adoption of principle of, *Lal* (302).
Development funds, *Dobbs* (59) 65422-6, 65525-6.
Economy, administrative, *Narendra* (408-9) 67861-9, 67889-94.
Education, *Sethi* (353).
Exports and imports, control of, *Sethi* (408-9) 67861-9, 67889-94.
Interest restriction, *Sinha, D. P.* (204), *Lal* (302).
Public borrowing, cessation of, *Dobbs* (59).
Publicity as to interest restriction, *Lal* (302).
Remedies other than co-operation not advocated, *Prasad* (162).
Usurious Loans Act (*which see below*), *Tuckey* (282-3), *Lal* (302).
Usury, penalisation of, *Tuckey* (282-3).

MONEYLENDERS :

Accounts, complicated, *Henry* (3) 65012.
not the Cause of indebtedness, *Ghose* (389-90).
Control indebted cultivators, *Heycock* (220) 66712-3, 66733.
Co-operative societies seldom controlled by, *Atkins*, 65064.
Debt, does not decrease, *Henry* (3).
Dishonest, usurious and relentless, *Prasad* (162) 66364-8.
Exorbitant interest and inhuman conditions, *Sethi* (353) 67524.
do not Harass, unless a quarrel arises, *Henry* (3) 65013.
Interest rates :
have been Reduced below those of co-operative societies, *Prasad* (165) 66461-4, 66468-70.
Twenty-four per cent and on grain loans fifty per cent, *Prasad*, 66364-8, 66461-4.
Mahajan, dominates the village where there is no co-operative society, *Atkins*, 65190.
Middlemen, *see under* **MARKETING.**
Punjabis, relentless, *Prasad* (162) 66382-4.
do not Seize land, *Henry* (3).
Thikidari system, *Tuckey* (286-7). (*See under* **LAND TENURE.**)
Unscrupulous, *Tuckey* (282-3), *Sinha, D. P.* (204).

MORTGAGES :

Non-terminable, should be prohibited, *Khan* (444), *Roy, S. K.* (461); should not be prohibited, *Atkins* (18), *Lal* (302).
Redemption :
Facilities for, of doubtful benefit, *Sethi* (353).
Special measures to deal with, advocated, *Ganga Vishnu* (38); not necessary, *Sinha, D. P.* (204).

AGRICULTURAL INDEBTEDNESS—contd.

MORTGAGES—*contd.*

Restriction, as to :
not Desirable unless holdings are made non-transferable, *Lal* (302) 67041-3.
Discussed, *Tuckey* (283) 66904-5, 66937-9.
to some Extent recommended, *Sinha, D. P.* (204).
Right of tenants to mortgage :
should be Conferred, *Arikshan Sinha* (261).
should be Limited, *Khan* (444).

REPAYMENT :

Compulsion recommended, *Lal* (302) 67089-91.
Prevented by :
Accumulated old debts, *Tuckey* (282), *Lal* (302) 67020-9.
Accumulation of high interest, *Heycock* (220).
Apathy of borrowers, *Prasad* (162).
Ceremonies, *Henry* (3).
Crop failures, *Henry* (3), *Ganga Vishnu* (38), *Arikshan Sinha* (261), *Ghose* (379).
Earnestness, lack of, *Tuckey* (282).
Excessive amount of loans, *Heycock* (220).
Extravagance, *Khan* (444).
Ganja, not by excessive use of, *Atkins*, 65256.
Illness, *Ghose* (379).
Improvidence, *Ganga Vishnu* (38).
Inability to liquidate by instalments, *Atkins* (18) 65199-202.
Income, smallness of, *Roy, S. K.* (461).
Interest, exorbitant, *Tuckey* (282), *Sethi* (353).
Interest, high, *Sinha, D. P.* (203), *Heycock* (220), *Lal* (302) 67020-9, *Khan* (444).
Keeping grain for better prices, *Lal* (302) 67020-9.
Limited resources, *Tuckey* (282).
Litigation, *Henry* (3), *Ghose* (379).
Soil, reduced productive capacity of, *Arikshan Sinha* (261).
Storage, bad arrangements, *Lal* (302) 67020-9.
Thriftlessness, *Sethi* (353).
Unproductive expenditure, *Sethi* (353), *Roy, S. K.* (461).
Usury, *Henry* (3).

RESTRICTION OR CONTROL OF CREDIT OF CULTIVATORS :

Central Provinces Land Revenue Act largely a failure in Sambalpur, *Foley* (225).
by Limiting right of mortgage and sale, deprecated, *Roy, S. K.* (461) 68266-8, 68297-306 ; recommended, *Khan* (444).
Suggestions as to, *Lal* (302) 67041-3.
not Recommended, *Henry* (3) 65014, *Atkins* (18), *Ganga Vishnu* (38-9), *Sinha, D. P.* (but restriction of mortgages to some extent recommended) (204), *Arikshan Sinha* (261), *Ghose* (379).

SOURCES OF CREDIT :

Agricultural produce, *Arikshan Sinha* (261).
Cattle, *Arikshan Sinha* (261).
Co-operative societies, *Prasad* (162), *Heycock* (220), *Ghose* (379), *Roy, S. K.* (461).
prosperous Cultivators, *Khan* (444).
Land, *Henry* (3), *Atkins* (18), *Ganga Vishnu* (38), *Arikshan Sinha* (261).
Landlords, *Prasad* (162).
Moneylenders, *Prasad* (162), *Heycock* (220), *Lal* (302), *Sethi* (353), *Ghose* (379), *Khan* (444), *Roy, S. K.* (461).
movable valuable property, *Ganga Vishnu* (38).
Towns drain away rural wealth, *Dobbs* (59).
Transfer of land should be facilitated, *Dobbs* (59).
Transfer right should be conferred on tenants, *Arikshan Sinha* (261).

AGRICULTURAL INDEBTEDNESS—concld.

USURIOUS LOANS ACT :

Application recommended, *Ganga Vishnu* (38), *Sinha, D. P.* (204) 66533-4, *Arikshan Sinha* (261), *Tuckey* (282), *Lal* (302) 67030, *Khan* (444), *Roy, S. K.* (461).
of Doubtful benefit, *Sethi* (353).
Ignorance of, among cultivators, *Ganga Vishnu*, 65321-5, *Tuckey*, 66906-8, *Lal*, 67031, 67050-1.
Interest reduction by co-operative societies should precede application of Act, *Arikshan Sinha* (261).
Useful as to previous debts of members of co-operative societies, *Heycock* (220) 66568-73, 66712-3.

AGRICULTURAL INDUSTRIES :

Advice, Government should supply scientific but not technical, *Dobbs* (64).

BASKET MAKING :

Carried on, *Lal* (304), *Prasad* (163).
a Caste occupation, *Roy, N. K.* (491).
Improvement necessary, *Prasad* (163).
Recommended, *Ghose* (387).
Bee-keeping :
Ignorance of methods, *Lal* (304).
Interest may be taken in, by villagers, *Lal* (304).
Blacksmiths, *Sinha, D. P.* (205).
Cardboard, utilisation of wheat straw for, will cause scarcity of fodder, *Arikshan Sinha* (268).
Catalogue of economic products suggested, *Dobbs* (64).

CHARKA SPINNING :

being Adopted, *Ganga Vishnu* (40) 65334-43.
Advocated, *Ganga Vishnu* (40).
Profits : about 1 anna for 3 or 4 hours' work, *Ganga Vishnu*, 65338-40.
for Women recommended, *Lal* (304).
Co-operation recommended, *Sinha, D. P.* (206), *Sethi* (359), *Ghose* (391), *Khan* (449), *Roy, N. K.* (493)-(495).
Co-operative supply of implements, raw material and marketing recommended, *Prasad* (163) 66306-11.

COTTAGE INDUSTRIES :

to Decrease fragmentation of holdings, recommended, *Sethi* (353).
Government aid suggested, *Atkins* (20).
organisation of, by Industries Department recommended, *Khan* (450).
Recommended, *Narendra* (411).
not Requiring valuable machinery recommended, *Lal* (304) 67040.
Demonstration recommended, *Sethi* (359).
Domestic service in towns, *Sinha, D. P.* (205).
Education in agricultural schools recommended, *Prasad*, 66377-9.

EMPLOYMENT, MEASURES FOR INCREASING IN RURAL AREAS :

on Construction of roads, *bunds*, tanks, canals and wells, recommended, *Ghose* (387).
of Educated persons (*See* Careers, *under* **EDUCATION** : AGRICULTURAL.)
Industrial concerns, large scale, would not increase rural employment, *Lal* (304).
Industrialism, the only means, *Arikshan Sinha* (268).
Market organisation recommended, *Sinha, D. P.* (206).
Transport facilities recommended, *Sinha, D. P.* (206).
Extension advised, *Dobbs* (64) 65527.

Finance :
Government help recommended, *Prasad* (163).
by Government on debentures advised, *Dobbs* (64).

AGRICULTURAL INDUSTRIES—contd.

FRUIT GROWING :

Agricultural Department should devote more attention to, *Ganga Vishnu* (40).
is Carried on, *Arikshan Sinha* (268).
Government aid suggested, *Sinha, D. P.* (206).
an Important agricultural pursuit, *Ganga Vishnu* (40).
Recommended, *Sethi* (359), (360), *Ghose* (387).
Research necessary, *Khan* (441).
Suggested, *Sinha, D. P.* (206).
Ghi-making carried on, *Prasad* (163) 66360-3.
Government aid suggested, *Sinha, D. P.* (206).
Gur :
(*See also* SUGAR MANUFACTURE *below*).
Indigenous methods of production, wasteful, *Dobbs* (70).
Price has fallen, *Dobbs*, 65529-31, 65626-30.
not Purchased by Lohat Sugar Works, *Henry*, 64958-60, 64985-6, 65,000.
Societies for production of, recommended, *Sethi* (360).

HEALTH CONDITIONS, DEVOTION OF SPARE TIME TO IMPROVING :

See also under **WELFARE OF RURAL POPULATION.**
Boy scouts, organisation of, recommended, *Roy, N. K.* (491).
Clubs, rural, recommended, *Sinha, D. P.* (206).
Co-operative societies recommended, *Ghose* (387).
Gymnasia recommended, *Sinha, D. P.* (206).
Lectures recommended, *Roy, N. K.* (491).
Organisation under expert supervision necessary, *Ganga Vishnu* (40).
Progress considerable, *Ganga Vishnu* (40).
Propaganda recommended, *Khan* (450).
Sanitary education recommended, *Ghose* (387).
village Societies recommended, *Arikshan Sinha* (268), *Khan* (450).
formation of Unions under Village Administration Act, 1892, recommended, *Prasad* (164) 66380-1.
Implements :
Co-operative manufacture recommended, *Khan* (450) made by Village carpenter, *Sethi*, 67637-8.
Importance of, *Sethi* (359).

INDUSTRIAL CONCERNS, MOVING OF, INTO RURAL AREAS :

Catechu (Kuth) industry might be moved to rural areas, *Sinha, D. P.* (206).
Markets, distance from, difficulties of, *Sinha, D. P.* (206).
Recommended, *Khan* (450) ; *not* recommended, *Prasad* (164) 66343-5, *Tuckey* (285), *Ghose* (387), *Roy, N. K.* (491).
Shellac industry might be moved to rural areas, *Sinha, D. P.* (206).
Shortage of agricultural labour would result, *Arikshan Sinha* (268).
Transport difficulties, *Sinha, D. P.* (206).
Industries Department should assist, *Prasad* (163) (171-2), *Sethi* (359), *Ghose* (391).
Instruction necessary, *Lal* (304).
Jungle products, sale of, *Sinha, D. P.* (205).
Jute spinning and weaving recommended, *Roy, N. K.* (490-1).
Knitting for women recommended, *Prasad* (163).
Lac Association, *Dobbs*, 65495-500. (*See also under* **NORRIS**)

LAC-CULTURE :

(*See also under* **NORRIS**).
in Chota Nagpur would be profitable, *Prasad* (163).
Ignorance of methods, *Lal* (304).
Interest may be taken in, by villagers, *Lal* (304).
Lyall, 67962, 67976.
Recommended, *Ghose* (387).
Lace-making for women recommended, *Prasad* (163).
LEISURE PERIOD, extent of, *Atkins* (20) 65203, *Prasad* (163), *Sinha, D. P.* (205), *Arikshan Sinha* (268), *Tuckey* (285), *Lal* (304), *Sethi* (359), *Ghose* (387), *Narendra* (411), *Khan* (449), *Roy, N. K.* (490).

AGRICULTURAL INDUSTRIES—contd.

MACHINERY :
Hire purchase system recommended, *Roy, N. K.* (491).
Long term loans for purchase of, at low interest recommended, *Roy, N. K.* (491).
Marketing, *see* SUBSIDIARY INDUSTRIES *under* **MARKETING.**
Matches, manufacture of :
Government aid suggested, *Sinha, D. P.* (206).
Suggested, *Sinha, D. P.* (206) 66532.
Milk industry recommended, *Prasad* (163).
Mining work, *Sinha, D. P.* (205).
Obstacles :
Conservation of cultivators, *Sinha, D. P.* (206), *Arikshan Sinha* (268).
Ignorance of methods, *Lal* (304), *Sethi* (359), *Roy, N. K.* (491).
Laziness, *Sethi* (359).
Marketing, *see above.*
Prejudice, *Tuckey* (285) 66951-4, *Sethi* (359), *Ghose* (387).
Training, lack of, *Ghose* (387), *Narendra* (411).
Transport difficulty, *Sinha, D. P.* (206).

OIL-PRESSING :
(*See also* OILCAKE *under* **FERTILISERS**).
Industry should be encouraged by loans under State Aid to Industries Act, *Roy, N. K.* (488).
Recommended, *Prasad* (164), *Sethi* (360).

ORGANISATION :
Lack of, *Prasad* (163).
of Supply of raw materials and marketing recommended, *Lal* (304).

PAPER MANUFACTURE :
From Rice straw :
Fodder scarcity would result, *Arikshan Sinha* (268).
Industry should be established, *Prasad* (164).
Suggested, *Lal* (304) 67052-3.
Sabai grass used, *Lyall*, 68012-4.

PISCICULTURE :
Recommended as a preventive of Malaria, *Sethi*, 67507-8.
Recommended, *Sethi* (359) 67507-8, *Ghose* (387).
Villagers would not take interest in, *Lal* (304).
Population, pressure of, subsidiary occupations necessary to relieve, *Prasad* (161-2).
Sethi (353) (359) 67633-8. (*See also under* **WELFARE OF RURAL POPULATION**).

POULTRY REARING :
at Dairies, recommended, *Roy, S. K.* (463).
Government should give information but not financial assistance, *Dobbs*, 65719-20.
Recommended, *Sethi* (358-9), *Ghose* (387).
Religious prejudice, *Prasad* (163), *Khan* (450), *Roy, N. K.* (491).
Villagers would not take interest in, *Lal* (304).

PREPARATION OF AGRICULTURAL PRODUCE FOR CONSUMPTION, INDUSTRIES CONNECTED WITH :
Government action not recommended, *Tuckey* (285).
Government assistance recommended, *Ghose* (387), *Khan* (450) 68228-31.
Government encouragement recommended, *Prasad* (164), *Roy, N. K.* (491).
Private enterprise recommended, *Tuckey* (285).
Recommended, *Sethi* (360).
Protection by import tariffs recommended, *Narendra* (411) 67845-60.
Railway work, *Sinha, D. P.* (205).
Rice hulling recommended, *Prasad* (164), *Sethi* (360) 67634-5.

AGRICULTURAL INDUSTRIES—contd.

ROPE-MAKING :

Carried on, *Prasad* (163), *Lal* (304).
Grass used, *Lyall*, 67909-10.
Recommended, *Ghose* (387).
Schools to teach carpentry, furniture manufacture, rope-making, etc., recommended, *Roy, N. K.* (491).

SERICULTURE :

a Caste occupation, *Roy, N. K.* (491).
Ignorance of methods, *Lal* (304).
Interest may be taken in, by villagers, *Lal* (304).
Recommended, *Sethi* (359-60), *Ghose* (387).
Soybeans should be investigated, *Dobbs* (64).
Slack season, method of spending, *Sinha, D. P.* (205).

SPINNING :

(*See also* Charka *above.*)
Recommended, *Prasad* (163), *Lal* (304), *Sethi* (359-60) 67633-8.
Splints, manufacture of, Government aid suggested, *Sinha, D. P.* (206).
Standard of life, improvement necessary, *Sinha, D. P.* (206) 66502-3.

STUDY, INTENSIVE, OF EACH RURAL INDUSTRY :

Necessary, *Ghose* (387).
not Necessary, *Sinha, D. P.* (206), *Arikshan Sinha* (268).
Recommended, *Khan* (450).
Urgently called for, *Prasad* (164).

SUGAR MANUFACTURE :

(*See also under* **RESEARCH,** *and* **HENRY** *and see* GUR *above*).
Government factories not recommended, *Meyrick*, 68074-9.
Recommended, *Prasad* (164).
White, manufacture, *Dobbs* (70-9) 65690-4, 65717-8.
Training :
by Government experts necessary, *Ghose* (387).
Necessary, *Narendra* (411).

WEAVING :

Dobbs, 65528.
by Hand, of cotton :
Finance, co-operative suggested, *Roy, N. K.* (490).
Recommended, *Roy, N. K.* (490).
Spinning mills for supplying yarn should be started by Government, *Roy, N. K.* (490).
Teachers necessary, *Roy, N. K.* (490).
by Jolahas, *Sinha, D. P.* (205).
Recommended, *Prasad* (163) 66214-23, 66348-55, *Sethi* (359).

AGRICULTURAL LABOUR :

ATTRACTING LABOUR TO AREAS WHERE THERE IS A SHORTAGE :

improved Communications, *Dobbs* (64-5).
very Difficult, *Sinha, D. P.* (206).
Experimental farms to determine most profitable crops, *Dobbs* (64-5).
labour Unions recommended, *Sinha, D. P.* (206).
Wages :
(*See also* WAGES *below*).
good, effective, *Ganga Vishnu* (40).
Higher, discussed, *Arikshan Sinha* (268-9).
Cost increasing owing to scarcity, *Narendra* (411).

CULTIVATION OF UNOCCUPIED LAND :

(*See also* DEVELOPMENT *below*).
very difficult, *Sinha, D. P.* (206).
Uncultivated land in Chota Nagpur should be developed by surplus labour assisted by grants of land, free railway travelling, housing arrangements and loans, *Ghose* (388).
labour Unions recommended, *Sinha, D. P.* (206).

AGRICULTURAL LABOUR—contd.

DEVELOPMENT OF UNCULTIVATED LAND :

(*See also* CULTIVATION *above*).
Cattle breeding, *Dobbs* (65).
Cultivation, demonstration of methods, *Dobbs* (65)
Gaya, uncultivated land, *Dobbs*, 65444.
Grants of land recommended, *Khan* (450).
Labour colonies recommended, *Khan* (450).
Scope for, *Dobbs*, 65400.
Wages, good, recommended, *Khan* (450).
Diseases decrease efficiency of labour, *Tuckey* (285).
Emigration, *Heycock*, 66622-32, 66754, *Ghose* (387-8) 67699-703.
See also Migration *below*.
Forced labour, *Arikshan Sinha* (268-9), *Tuckey* (280) (287).
Kamai system :
should be Revived, *Khan* (450).
is not Serfdom, *Khan*, 68198-202.
Kamiauti Agreements Act, ineffective, *Heycock*, 66680-5, 66700.
Labour colonies recommended, *Khan* (450).
Labour-saving machinery recommended, *Ghose* (374).
Manual labour, prejudice against, *Arikshan Sinha* (268-9) 66863-6.

MIGRATION :

(*See also* EMIGRATION *above and* Recruitment *below*).
to Bengal during rice harvesting season, *Ganga Vishnu* (40).
Prosperity of emigrants, *Ganga Vishnu*, 65332-3.
to Purnea District, *Ganga Vishnu* (40).
Shortage caused by, *Khan* (450).
in the Slack season to Calcutta, Jamshedpur, etc., *Sethi* (359).
to Towns causing scarcity, *Narendra* (411).
Population, *see under* **WELFARE OF RURAL POPULATION.**
Recruitment for tea gardens of Assam, etc., from Chota Nagpur should be prohibited by law, *Ghose* (387-8) 67692-4.

SHORTAGE :

Caused by migration to industries, poor return from the soil and disinclination for hard labour, *Ganga Vishnu* (40).
in Chota Nagpur owing to very thin population and emigration, *Ghose* (387-8).
Existence of, *Arikshan Sinha* (268-9).
is General, *Ganga Vishnu* (40).
Migration causes, *Khan* (450).
none in Patna Division, *Heycock* (223).
Seasonal only, *Tuckey* (285).
Subsidiary industries would not aggravate, *Khan*, 68228-31.
Supply :
Organisation necessary, *Sinha, D. P.* (206).
Spasmodic, *Sinha, D. P.* (206).

WAGES :

in Kind, *Lal*, 67054-62.
Rates, *Ganga Vishnu* (40), *Arikshan Sinha* (268-9).
should be Systematised, *Khan* (450).
Uneconomic, *Heycock*, 66680-5, 66700.

ALKALI LAND, *see under* **SOILS.**

ANIMAL HUSBANDRY. (*See also under* **QUINLAN.**)

Buffalo breeding : Cattle Committee recommended that Sipaya should be used, *Dobbs*, 65662-3.

BULLS :

Brahmini: *Arikshan Sinha* (267) 66817-9; of no use, *Sethi* (358) 67648-50.
Co-operative maintenance advised, *Atkins* (20).

ANIMAL HUSBANDRY—contd.

BULLS—*contd.* :

District boards should maintain, *Arikshan Sinha* (267), *Narendra* (408) (410).
Free use recommended, *Arikshan Sinha* (267).
Municipalities should maintain, *Narendra* (408) (410).
at Village farms recommended, *Sethi* (358).
Bullocks :
Feeding, *Atkins*, 65249-51.
Tractors do not supplant, *Atkins*, 65246-8.

CATTLE :

Condition :
Miserable, *Sinha, D. P.* (205).
in Orissa appalling, *Sethi* (357).
Export, see below.
Manure, *see* COWDUNG *under* **FERTILISERS.**
Mortality, see below.
Number excessive, *Lyall*, 67963-5. Heavy decrease in number, *Arikshan Sinha* (264-5); has decreased supply of dung, *Arikshan Sinha* (264-5).
Straying, *see under* **CROPS AND CROP PROTECTION.**
Uneconomic : reduction recommended, *Sethi* (359) 67545-6, 67651.

CATTLE BREEDING :

not Commercially profitable, *Dobbs*, 65562.
Co-operative, *see under* **CO-OPERATION.**
Cross-breeding with cattle from Punjab recommended, *Khan* (449).
Dual purpose recommended, *Sethi* (358) 67606, *Khan* (449).
in an Experimental stage, *Heycock* (220).
for Export, *Dobbs*, 65491-4.
Farms :
at Cuttack, proposed, *Heycock* (220).
at Patna being established, *Heycock* (220).
Government farms should be increased, *Roy, N. K.* (487).
Herds kept, *Sethi* (358).
Holstein bulls, cross-breeding with Indian Stock advised, *Dobbs* (63) 65486-8.
for Milk chiefly, *Dobbs*, 65664-7.
Profitable, *Ganga Vishnu*, 65351-6.
Propaganda :
Co-operative, recommended, *Roy, N. K.* (487-8).
Finance by Government and district boards, *Roy, N. K.* (488).
Lectures, magic lantern, recommended, *Roy, N. K.* (487-8).
Mortality, *see below.*
Police should assist, *Roy, N. K.* (488).
Shows recommended, *Roy, N. K.* (488).
Pusa :
Cross-bred bullocks commended, *Meyrick*, 68096-9.
Successful work, *Khan* (449).
Railway freights on breeding stock should be reduced, *Roy, N. K.* (487).
Staff, Government, should be increased, *Khan* (449).
Stock should be distributed at reduced prices, *Roy, N. K.* (487).
Uneconomic, *see below.*
Cattle insurance co-operative societies recommended, *Khan* (452).
Census, *see under* **STATISTICS.**
Co-operative assistance recommended, *Roy, S. K.* (463).
Cows, feeding of, *Dobbs*, 65489-90.

DAIRYING :

Co-operative, recommended, *Sinha, D. P.* (205) (207), *Sethi* (358), *Khan* (449).
Farms recommended, *Sinha, D. P.* (205).
Government aid suggested, *Sinha, D. P.* (206).
Middle class youths should be encouraged to take up, *Sethi* (358).
Milk :
(*see also under* **CO-OPERATION.**)
Market for, in towns, *Ghose* (383) (386).

ANIMAL HUSBANDRY—contd.

DAIRYING—*contd.*

Model farms :
Mixed, Government aided, co-operative, recommended, *Roy, N. K.* (488-90).
with Poultry recommended, *Roy, S. K.* (463).
Recommended, *Sethi* (358) 67622-6, *Ghose* (387).
Schools recommended, *Khan* (449).
Disease, *see under* **VETERINARY.**
Draught cattle, cost of hiring, *Prasad*, 66463.
Education, *see under* **EDUCATION** : AGRICULTURAL.

EXPORT OF CATTLE :

to Bengal, etc., from Muzaffarpore, *Ganga Vishnu* (40) 65294, 65351-2.
should be Discouraged, *Narendra* (408).

FODDER :

(*See also under* **FORESTS**).
Barley straw recommended, *Arikshan Sinha* (267).
Crops : *see under* **CROPS AND CROP PROTECTION.**
Dry, shortage of, *Ganga Vishnu* (40) 65280-2, 65354-7.
Green :
Absence of, from March to June, *Arikshan Sinha* (267).
Supply in July to September, *Arikshan Sinha* (267).
Importation suggested, *Ghose* (386-7).
Leaves used, *Dobbs*, 65561-2.
Makai, *Arikshan Sinha* (267).
Oil-pressing industry should be encouraged by loans under State Aid to Industries Act, *Roy, N. K.* (488).
Rice dust as cattle food recommended, *Sethi* (358).
Rice Straw :
Good, *Lal*, 67073-80.
Paper making from, effect upon supply, *Lal*, 67052-3.
Reservation for cattle recommended, *Sethi* (359).
used for Thatching, *Sethi* (358-9).
Shortage period, *Atkins* (20) 65243-5, *Sinha, M. S.*, 66979-80, *Sinha, D. P.* (205), *Heycock* (223), *Arikshan Sinha* (265) (268), *Sethi* (359), *Ghose* (387), *Narendra* (410) 67870-2, *Khan* (449), *Roy, N. K.* (490).
Silage, *see below.*
Supply must be increased, *Roy, N. K.* (488) (490).
Transport facilities necessary, *Ghose* (386), *Roy, N. K.* (488).
Varieties used, *Khan* (449).
Wheat and barley straw best, *Arikshan Sinha* (267).
Goats recommended, *Sethi* (358).

GRAZING :

(*See also under* **FORESTS** *and see* PASTURES *below*).
Common grounds :
Adequate provision of, impossible, *Heycock* (223).
Dwindling, *Dobbs* (63).
of no real Help, *Heycock* (223).
Overstocked by uneconomic cattle, *Foley* (227).
Price of bullocks increasing because of scarcity of grazing grounds, *Dobbs*, 65668-9.
Shortage of, *Arikshan Sinha* (264-5).
Uneconomic cattle, breeding of, encouraged by, *Heycock* (223).
Waste lands, very little in Patna Division, *Heycock* (223).

IMPLEMENTS, IMPROVED :

better Cattle necessary for, *Ganga Vishnu*, 65294.
Cattle unsuitable to draw heavy ploughs, *Henry* (5), *Heycock* (222), *Narendra*, 67881-5.

IMPROVEMENT :

by District boards necessary, *Sinha, D. P.* (205).
by influential villagers necessary, *Sinha, D. P.* (205).
Inadequacy of livestock, *Ganga Vishnu* (40).

ANIMAL HUSBANDRY—concld.

LANDLORDS :

(*See also under* **LAND TENURE.**)
Encouragement to take interest in, necessary, *Sethi* (359).
cannot be Induced to take interest in unless forced by law, *Sinha, D. P.* (205).
not Interested in, *Heycock* (223).
have done Nothing to improve, *Sethi* (359) 67526-8, 67654-6.
Propaganda to lead to greater interest, recommended, *Khan* (449).
Local conditions : breeding must be adapted to, *Dobbs* (64).
Military Department's experience and breeding work should be utilised, *Dobbs* (63-4).

MORTALITY OF CATTLE :

Heavy, *Prasad* (162).
Indebtedness caused by, *Prasad* (164-2).

PASTURES : (*See also* GRAZING *above.*)

Common :
Emaciated cattle, *Atkins* (20).
Extension recommended, *Arikshan Sinha* (267) 66843-4.
Fencing recommended, *Roy, N. K.* (489-90).
Legislation necessary, *Sinha, D. P.* (205).
None in Dowlatpore, *Atkins* (20).
Overstocked, *Sinha, D. P.* (205), *Arikshan Sinha* (264-5) (267), *Ghose* (386), *Narendra* (410), *Roy, N. K.* (489).
Ploughing recommended, *Ghose* (386), *Roy, N. K.* (489-90).
Shortage of, *Narendra* (408) (410), due to pressure on the land, *Ganga Vishnu* (4) 65354-7.

Co-operative societies recommended, *Sethi* (358).

Enclosed :
Absence of, *Ghose* (386), *Khan* (449), *Roy, N. K.* (489).
on Paddy fields, *Arikshan Sinha* (267).
Fees should be charged, *Sethi* (358).
Legislation necessary, *Arikshan Sinha* (268).
Shortage of, *Sethi* (358).
Patna cattle giving good milk yield, *Ganga Vishnu*, 65303.
Pinjrapoles, *Sethi*, 67566-8.

PLOUGH CATTLE :

Improvement of, necessary, *Gibson* (418).
Prices :
better in Bengal, *Ganga Vishnu*, 65351-3.
very High, *Ghose* (378).
Increasing, *Dobbs*, 65668-9.
Propaganda recommended, *Sethi* (357-8) 67651-6.
Pusa sales, *Ganga Vishnu*, 65301-2.

ROOT CROPS :

Encouragement by Government recommended, *Roy, N. K.* (488).
Food tests recommended, *Roy, N. K.* (488).
Sheep recommended, *Sethi* (358).

SILAGE :

by Co-operative societies recommended, *Sinha, D. P.* (205).
Crops recommended for, *Quinlan* (128).
Recommended, *Sethi* (358-9), *Ghose* (386), *Narendra* (408) (410), *Khan* (446) (449), *Roy, N. K.* (489).
not Used by cultivators, *Khan*, 68196-7.

STALL-FEEDING :

Good results of, *Foley* (227).
Recommended, *Dobbs* (63) 65493-4, *Heycock* (223), *Sethi* (358-60) 67609-11, *Lyall*, 68015, *Gibson* (418).

ANIMAL HUSBANDRY—concld.

UNECONOMIC CATTLE :

Adverse effect of, *Foley* (227).
Elimination necessary, *Heycock* (223).
Hindu religion prevents destruction of, *Foley* (227).

ARBITRATION, *see under* LITIGATION *under* **WELFARE OF RURAL POPULATION.**

ATKINS, C. G., the Dowlatpore Agricultural Concern, Rusera Ghat, Bengal and North Western Railway (15-36).

ADMINISTRATION :

Pusa Research Institute : should do local demonstration and propaganda work, 65148-53.

Transport :

Railways :
Corruption :
Appalling (17).
Complaints ignored, 65109-16.
Roster system does not work, 65195-6.
Wagons, distribution haphazard (17).

Roads :

Condition disgracefully bad (17-18).
Main roads :
District boards control (18) 65118-26, 65141-7, 65260.
Exclusion of cultivators' cart from better portion (18) 65117-26, 65254.
Extortion by district board peons (18).
Private estates, roads through, maintained by district boards, 65141-7.
Village roads : cess, larger proportion of, should be spent on (18) 65179-82.

AGRICULTURAL DEPARTMENT :

Services : not entirely satisfactory (17).
Staff, inadequate, 65050-2.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : thriftlessness and extravagance (18).
Mahajan : dominates the village where there is no co-operative society, 65190.
Mortgages, non-terminable : should not be prohibited (18).
Repayment, prevention of :
not due to excessive use of *Ganja*, 65256.
Inability to liquidate by instalments (18) 65199-202.
Restrictions on credit of cultivators not advisable (18).
Source of credit : land (18).

AGRICULTURAL INDUSTRIES :

Cottage industries, Government aid suggested (20).
Leisure period : cultivator has work for 200 days in year on holding (20) ; is unemployed during Slack season (20) 65203.

ANIMAL HUSBANDRY :

Bullocks :
Feeding, 65249-51.
Tractors do not supplant, 65246-8.
Bulls, pedigree : co-operative maintenance advised (20).

Fodder :

Difficulty of growing fodder crops, 65097-9.
Shortage from December to middle of March (20) 65243-5.

Pastures, common : None in Dowlatpore (20).

ATKINS, C. G.—contd.

CO-OPERATION :

Audit :
more Organisation required, 65068-9.
Satisfactory, 65068.
Confidence in, extending, 65066-7.
Consolidation of holdings societies : impossible (22).
Credit societies :
Interest : too heavy (21) 65054-9.
Repayment instalments should be relaxed (21).
Reserves should be used, 65057-9, 65204-9.
a partial Success (21) 65053-4.
Education : inadequate, 65070-3, 65183-4, 65178.
Guaranteeing unions : next grade above primary societies, 65074.
Improvements, societies for effecting :
in Flooded areas should be organised (21).
Legislation : Act should be amended (21-2).
Loans to societies should be at bank rate (21).
Malfeasance : occurs occasionally, 65065.
Management :
is by the People, 65172-5.
Satisfactory, 65060-2.
Meetings :
well Conducted, 65078.
Monthly, 65074-5.
in Vernacular, 65076.
Moneylenders : seldom control societies, 65064.
Non-officials : Government encouragement advised (20).
Objects : partially achieved (22) 65079, 65176.
Purchase societies :
for Implements, co-operative use of (22).
Necessary (21).
Sale societies :
Advocated (21).
Central organisation at first, advised (21).
None exist, 65177.
Scope : should be narrow at first (21).
Staff : inadequate (20).
Supervision, necessary as to accounts, 65063.
Rural betterment societies advocated, 65100-1.

CROPS AND CROP PROTECTION :

Improvement : better cultivation and manuring advised (19).
Introduction of new crops : Central Co-operative Banks should undertake (19).
Seed distribution : Central Co-operative Banks should undertake (19).
Sugarcane, Coimbatore, supplanting indigenous varieties (19) 65045-9.
Wheats, Pusa :
Cultivation of, advised (19).
Soils must first be improved (19) 65238-42.

DEMONSTRATION AND PROPAGANDA :

Cultivators not conservative, 65047-9, 65154-5.
on Cultivators' own fields advocated (17).
Expert advice : should be free and given in villages (17).
Farms, co-operative, advocated (15).
Fertilisers, demonstration and propaganda advised (19).
Meetings, found successful (16-17) 65156-7.
Pamphlets, found successful (17) 65156-60.
Planters, European : useful example, 65152-7.
Pusa Research Institute : should do local demonstration and propaganda, 65148-52, 65161.
Sugarcane, successful propaganda of improved varieties, 65153, 65161-2.

DOWLATPORE AGRICULTURAL CONCERN : Loans made to cultivators of cane sets by, 65187-9.

ATKINS, C. G.—contd.

EDUCATION :

Adult : demonstration farms advocated (16) 65183-4.
Agricultural :
Administration, by Central Co-operative Banks advocated (16) 65193-4.
Demand :
None, 65170 ; should be stimulated, 65170-1.
Farms, co-operative demonstration, advocated (15).
Incentive, hope of Government posts (16).
Institutions, absence of, in Begusarai and Samastipore (15).
Teachers :
Absence of, in Begusarai and Samastipore (15).
Agricultural classes, should be drawn from (15).
Teaching facilities, urgent need of in Begusarai and Samastipore (15).

Co-operative schools :
Finance : funds derived from profits of societies, 65138-40.
Primary, 65136-7, 65178.
Finance, co-operative, advocated (16).
Middle class youths, could be attracted to agriculture by :
Financial assistance in developing uncultivated land (16) 65210-37.
Grants of land (16) 65210-37.
Training in agriculture (16) 65210-37.
School farms, useful if properly controlled (16).
School plots, useful if properly controlled (16).

FERTILISERS :

Cowdung :
the Best fertiliser (19) 65088-92, 65164-6.
Fuel, use of as, should be discouraged (19) 65093-6.
Fuel, wood : impossible to ensure adequate supply, 65127-31.
Price : an anna a maund, 65087.
Dowlatpore, considerably increased use of manures in (19).
Farms, demonstration, advised (19).
Propaganda advised (19).

FINANCE :

Taccavi :
through Co-operative societies advocated (18) 65197-8.
fuller Use by cultivators not advocated (18).

HOLDINGS, consolidation quite impossible (18).

IMPLEMENTS :

Blacksmiths' shops necessary (20).
Carpenters' shops necessary (20).
Hire-purchase system necessary (20).
Hoe, Indian : the only implement for sale in bazaar (20).
Ploughs : Iron mould-board :
Advised (19).
being Adopted, 65167-9.
no Selling agency exists (20).
Spare parts, selling agencies necessary (20).
Tractors : bullocks not supplanted by, 65246-8.

IRRIGATION :

Pumping stations with pipe lines from rivers in North Bihar suggested (18).
Scope for, great, 65185.
Wells, tanks, etc., not feasible in North Bihar (18) 65185-6.

MARKETING, moneylender as a middleman employs questionable methods (21) 65261-3.

ATKINS, C. G.—contd.

PANCHAYATS :

Arbitration by, advised (20).
Village panches : should have status of panchayats (20).

RENTS, 65264-7.

Rotation, improvement (19) 65163.

SOILS :

Floods :
Erosion causes marked deterioration (19).
Silt deposit causes marked improvement (19).
Improvement : better methods of cultivation, farmyard manure and drainage advised (18).
Reclamation :
Drainage of lakes advised (19).
Middle classes youths should be given financial assistance to develop uncultivated land (19).

VETERINARY :

Contagious diseases :
Legislation advocated (20).
Obstacle to dealing with : superstition (20).
Departmental Staff :
inadequate (17).
more Touring advised (20).
Dispensaries :
District boards control (20).
Services : system works well (20).
Staff insufficient (20).
Touring, practically do not exist (20).
Use of, by agriculturists, not full (20).

WELFARE OF RURAL POPULATION :

Dispensaries :
Inadequate, 65133-5.
Municipal control, 65133-5.
Drinking water :
very Bad, 65102.
Legislation necessary, 65106-8.
Wells, contaminated, 65103-5.

BANKS, *see under* **CO-OPERATION** *and* **FINANCE.**

BASKET-MAKING, *see under* **AGRICULTURAL INDUSTRIES.**

BEE-KEEPING, *see under* **AGRICULTURAL INDUSTRIES.**

BERY, K. R., Superintending Engineer, Irrigation, Orissa Circle (309-15). (*See also* **SARUP** (*witness*)).

AGRICULTURAL DEPARTMENT : Responsible for sinking of wells, 67096-8.

IRRIGATION :

Distribution : in Orissa very wasteful, 67105-8.
Extension, little scope for, 67093-5, 67165-71, 67181-4.
Floods :
Committee of enquiry, 67123-9.
Drainage, 67130-4.

BERY, K. R.—contd.

IRRIGATION—*contd.*

Floods—*contd.*

Rivers:
Beds, raising of, 67114-29.
Bunds, 67109-29, 67142-3.
Changing course, 67135-43.
Water hyacinth, none in canals and rivers, 67144-7.
Minor works:
Bihar, 67172-3.
Irrigation Department responsible only for schemes referred to it by civil authorities, 67099.
Propaganda, 67099-104.
Orissa, a loss being incurred, 67157-8.
Permanent settlement, in relation to irrigation, 67185-91.
Private, 67176-7.
Rainfall, 67165-70.
Rates, 67157-64, 67178.
Son Canal, 67185-91.
Survey, 67179-80.
Tribeni Canal, no scope for extension, 67192-4.
Wells: Agricultural Department responsible for sinking, 67096-8.

LAND TENURE: Permanent settlement, 67185-91.

WATER HYACINTH, none in canals or rivers, 67144-7.

BIHAR PLANTERS ASSOCIATION, *see under* **MEYRICK.**

BOARDS OF AGRICULTURE, *see under* **ADMINISTRATION.**

BLAIR (*witness*), *see under* **LAMBERT AND BLAIR.**

BOY SCOUTS, *see under* **EDUCATION.**

CAPITAL, ATTRACTING OF, TO AGRICULTURE:

Advertisement recommended, *Sinha, D. P.* (208).
Agricultural Association, all-India, recommended, *Khan* (453).
Capitalist land monopoly, danger of, *Arikshan Sinha* (262) (271-2) 66840.
Decorations (honours) for capitalist agriculturists, recommended, *Khan* (453).
Demonstration, practical, that farming can be made to pay, recommended, *Ghose* (395).
Difficulty of making farming profitable when paying for labour, *Dobbs* (53-5) 65399.
Facilities:
for Capitalist acquisition of land necessary, *Arikshan Sinha* (271).
Special, recommended, *Sinha, D. P.* (208).

IMPROVEMENTS DISCOURAGED BY:

Education, landlords' lack of, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Factors discouraging, *Arikshan Sinha* (272).
Ignorance of cheap methods, *Sinha, D. P.* (208).
Interest, landlords' lack of, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Law of resumption by superior landlord in the event of failure of heirs, *Roy, S. K.* (469).
Litigation, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Oppression of landlords, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Rent restriction, *Ghose* (395).
Restrictions of tenancy legislation, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Return on capital invested, lack of confidence as to, *Ghose* (395), *Khan* (453).
Sub-division of proprietary rights in land, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Tenure: (*See also under* **LAND TENURE**).
Insecurity of, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
System, *D.P. Sinha* (208).
Thikidari system of leasing villages to temporary tenure holders (*see under* **LAND TENURE**).
Transfer of tenancies, prohibition of, in Chota Nagpur, *Ghose* (395) (*See also under* **LAND TENURE.**)

CAPITAL, ATTRACTING OF, TO AGRICULTURE—contd.

Landlords' lack of capital, *Meyrick*, 68046-50.
Need of capital, *Ghose*, 67715-9.
Planters' capital requirements, 3 lakhs, *Meyrick*, 68054-70, 68134-5, 68143, 68151-8, 68168-79, 68184-9. (*See also* SUGARCANE *under* **CROPS AND CROP PROTECTION.**)

CHATTERJI, B. M., Assistant Director of Agriculture in North Bhagalpur, on Co-operation (65-6).

CHOTA NAGPUR :

Intensive development advocated, *Roy, S. K.* (470).
Tenancy Act, *Foley* (225).

COMMUNICATIONS, *see under* TRANSPORT *under* **ADMINISTRATION.**

CO-OPERATION : (*See also under* **PRASAD** *and* **GHOSE.**)
Adult education, movement must be a system of, *Roy, N. K.* (492).
Agricultural Associations, *see under* **DEMONSTRATION AND PROPAGANDA.**

AGRICULTURAL DEPARTMENT :

not much Assistance from, *Roy, N. K.*, 68368, 68385-99.
Co-operation with, suggested, *Arikshan Sinha* (271).
close Touch with, in Orissa, *Sethi*, 67605.
should work in close Touch with Registrar, *Heycock* (220) 66741.

Arbitration, *see under* LITIGATION *under* **WELFARE OF RURAL POPULATION.**

Audit :

Essential, *Heycock* (223) 66565, 66742.
Government should control and pay for, *Roy, S. K.* (466) 68265.
more Organisation required, *Atkins*, 65068-9.
Satisfactory, *Atkins*, 65068.
Bank, All-India Reserve or State, co-operative movement should be linked with, *Roy, S. K.* (459-60) 68236-42, 68293-6.
Banking : not successfully managed, *Sinha, D. P.* (203) 66494-6. (*See under* **FINANCE.**)
Banks, Central, *see below.*
Bhadralog class alone benefited, *Sinha, D. P.* (207).
Boy Scout movement, *Roy, S. K.* (466); recommended, *Roy, N. K.* (491) (497) (499).

CATTLE BREEDING CO-OPERATIVE SOCIETIES : (*See also under* **ANIMAL HUSBANDRY.**)

Bulls, co-operative societies should distribute, *Quinlan*, 66020.
Encouragement by Government and district boards recommended, *Roy, N. K.* (498).
not Feasible, *Arikshan Sinha* (271).
Popularisation recommended, *Sinha, D. P.* (207).
very Rare, *Sinha, D. P.* (207).
should Receive breeding stock free from Government farms, *Ghose* (386) (394).
Recommended, *Sethi* (358); *Khan* (452) 68219-21; *Roy, S. K.* (463); *Roy, N. K.* (498).
Cattle insurance societies recommended, *Khan* (452).

CENTRAL BANKS :

Criticism of finance policy, *Roy, S. K.*, 68238-41.
District boards :
Connection with, necessary, *Roy, N. K.* (496).
should Deposit funds with, *Roy, N. K.* (497).
Education, agricultural, should be administered by, *Atkins* (16) 65193-4.
Good work of, *Roy, N. K.*, 68366.
merely cheap Moneylenders, *Sethi* (360-1) 67523-5, 67529-32.
New crops, should undertake introduction of, *Atkins* (19).

CO-OPERATION—contd.

CENTRAL BANKS—*contd.*

Seed distribution, should undertake, *Atkins* (19).
Statistics, should undertake, *Roy, S. K.* (469).
Supervision of primary societies necessary, *Roy, N. K.*, 68366-7, 68400-3.
Cheque, use of, should be encouraged, *Sinha, D. P.* (207).
Chota Nagpur, intensive co-operative development advocated, *Roy, S. K.* (470).
Confidence, extending, *Atkins*, 65066-7.

CONSOLIDATION OF HOLDINGS SOCIETIES : (*See also under* **HOLDINGS.**)

Impossible, *Atkins* (22).
Popularisation recommended, *Sinha, D. P.* (207).
very Rare, *Sinha, D. P.* (207).
Recommended, *Arikshan Sinha Prasad* (162-3) (271); *Sethi* (353); *Roy, S. K.* (462); *Khan* (452).

CREDIT SOCIETIES :

Banks, in place of, recommended, *Sinha, D. P.* (203) 66494-6.
Best means of financing and teaching ryots, *Henry* (3) (5-6) 65020-1.
Borrowing by members excessive, *Dobbs* (65) 65452.
Business morality of members, importance of, *Sinha, D. P.* (207).
Deposits, landlords and bankers should be persuaded to make, *Khan* (452).
Difficulties of, *Ross* (339).
Extension necessary, *Tuckey* (281).
Imperial Bank should lend to Provincial Bank at 3 per cent., *Roy, N. K.* (498).
Indebtedness of members increasing, *Dobbs* (65).
Interest, *see below.*
merely Lend at lower rates of interest than moneylenders, *Dobbs* (65).
Loans :
for Ceremonies should not be given, *Tuckey* (281).
Cheque payment recommended, *Sinha, D. P.* (207).
insufficiently Controlled, *Sethi* (360) 67611-6,
from Government, free of interest, recommended, *Khan* (451).
Long term :
Government financial assistance to Provincial Bank recommended, *Roy, N. K.* (485) (498).
Tuckey (281) 66877-80.
For Manure should not be in cash but in kind, *Sethi* (355) 67519-25.
Multiplication of societies as at present organised not recommended, *Roy, N. K.* (498).
Restriction of activities of societies to credit, deprecated, *Roy, N. K.* (484-5).
Use of, importance of, *Sinha, D. P.* (207).
Main co-operative activity, *Sethi* (360).
Members often go to moneylenders, *Heycock* (220).
Objects not achieved in Orissa, *Sethi* (361).
the most Popular, *Sinha, D. P.* (207).
Repayment instalments should be relaxed, *Atkins* (21).
Reserves should be used, *Atkins*, 65057-9, 65204-9.
Short term credit recommended, *Roy, S. K.* (460-1).
a partial Success, *Atkins* (21) 65053-4.
State Co-operative bank :
Branch in every village recommended, *Khan* (444).
Recommended, *Khan* (444).
Working well, *Arikshan Sinha* (270).
Criticism of movement, *Ganga Vishnu*, 65313-20.

DAIRIES : (*See also under* **ANIMAL HUSBANDRY.**)

Farms recommended, *Sinha, D. P.* (205) (207).
Milk, *see below.*
Mixed model farms recommended, *Roy, N. K.* (488-9).
Recommended, *Sethi* (358).
Danger of over-expansion without adequate inspecting agency, *Heycock* (223-4).
Demonstration, *see* CO-OPERATIVE *under* **DEMONSTRATION AND PROPAGANDA.**

CO-OPERATION—contd.

Department: activities diffused, *Sinha, D. P.* (203).
Development Officer should control Co-operative, Veterinary and Agricultural departments, *Heycock* (222) 66583-7, 66662.

DISTRICT BOARDS:

Assistance received from, *Roy, N. K.*, 68369.
Connection with Central Banks necessary, *Roy, N. K.* (496).
Connection with movement, *Roy, S. K.* (466).
Contracts should be placed with co-operative societies, *Roy, N. K.* (498).
Deposit of funds with Central Banks suggested, *Roy., N. K.* (497).
Favoured-village policy recommended, *Roy, N. K.* (498).
Drainage recommended, *Arikshan Sinha* (271).

EDUCATION:

Adult, recommended, *Prasad* (160) 66306-11, *Ghose* (374) (385).
Agricultural, Central Banks should administer, *Atkins* (16) 65193-4.
as to Credit, necessary, *Roy, S. K.* (460) (465) 68240.
Department, no relationship with, *Roy, N. K.*, 68369.
Inadequate, *Atkins*, 65070-3, 65183-4, 65178.
Lack of, *Henry*, 65022-3.
should be the Main object of co-operation, *Roy, N. K.* (492-3).
Managing committees, Department should be represented upon, *Prasad* (160) 66376.
of Members:
Neglected, *Sethi*, 67611-6.
Recommended, *Roy, N. K.* (493).
Recommended, *Ghose* (374) (385) (391) 67826; *Roy, S. K.* (369); *Roy, N. K.* (493) (495) 68369.
Schools, *Atkins*, 65136-40, 65178, *Roy, N. K.* (493) (495) 68369.
School teachers, *see below.*
Training, of workers, *see below.*
Work very small, *Lambert* and *Blair*, 67246.
Embezzlement, danger of, *Heycock* (220) (223) 66565.
Federation: Subsidies from Government and district boards recommended, *Roy, N. K.* (494-5) 68358, 68377-81, 68388-90, 68396-403.
Fencing recommended, *Sethi* (356) 67643.
Fertilisers, *see* CO-OPERATIVE *under* **FERTILISERS.**
Finance, large advances from Government recommended, *Arikshan Sinha* (270).
Godowns, *Roy, N. K.* (487).
Government policy suggested, *Roy, S. K.* (465-6) 68249-50, 68286-8, *Khan* (451).
Grain golas, *Sethi* (360).
Guaranteeing unions: next grade above primary societies, *Atkins*, 65074.

Health societies, *see under* **WELFARE OF RURAL POPULATION.**
Hospitals suggested, *Sinha, D. P.* (207) 66506-7.

Hospitals, *see under* **WELFARE OF RURAL POPULATION.**

IMPLEMENTS:

Distribution of, recommended, *Khan* (447-8) (452); suggested, *Heycock* (222); *Ghose* (384-5); *Narendra* (408).
Hiring to members and non-members recommended, *Sinha, D. P.* (205); *Sethi*, 357; *Arikshan Sinha* (266) (271).
Loans for purchase of, recommended, *Khan* (447-8).
Machinery, *see below.*
Popularisation by societies recommended, *Henry* (5).
Purchase societies necessary, *Atkins* (21-2); *Sinha, D. P.* (207); *Sethi* (357); *Khan* (452).

IMPROVEMENTS:

Large, finance by land mortgage banks, *Roy, S. K.* (465).
Minor, by individuals with co-operative assistance, *Roy, S. K.* (465).
Work recommended, *Roy, N. K.* (483-4) (487-8) (493) 68382-91.

CO-OPERATION—contd.

IMPROVEMENTS, SOCIETIES FOR EFFECTING :

in Flooded areas should be organised, *Atkins* (21).
Legislation : Act should be amended, *Atkins* (21-2).
Loans to societies should be at bank rate, *Atkins* (21).
Popularisation recommended, *Sinha, D. P.* (207).
very Rare, *Sinha, D. P.* (207).
Recommended, *Arikshan Sinha* (270-1) ; *Khan* (452).
Interest : Reduction recommended, *Atkins* (21) 65054-9 ; *Arikshan Sinha* (261) (270) ; *Khan* (441) (452) ; *Roy, S. K.* (460) ; *Roy, N. K.* (485).

IRRIGATION :

Difficulty of, *Heycock*, 66617.
Government assistance necessary, *Dobbs* (66).
Recommended, *Roy, N. K.* (485-6).
Schemes suggested, *Sinha, M. S.* 66981-5.
Societies recommended, *Sethi* (354).
Tank construction recommended, *Ghose* (380).

JOINT FARMING SOCIETIES :

not Feasible, *Arikshan Sinha* (271).
Government financial help recommended, *Roy, S. K.* (458) (464-5).
Limited liability recommended, *Roy, S. K.* (458) (464-5).
Popularisation recommended, *Sinha, D. P.* (207).
very Rare, *Sinha, D. P.* (207).
Recommended, *Prasad* (163) (167) ; *Ghose* (379) ; *Khan* (452) ; *Roy, S. K.* (458) (464-5).
Lac central marketing agencies suggested, *Norris* (479) 68314-5.
Landholders' inertia an obstacle, *Ganga Vishnu* (38).
Liquidation : *Heycock*, 66565-7, 66665-8.
Livestock societies recommended, *Sethi* (358) (*See* CATTLE BREEDING CO-OPERATIVE SOCIETIES *above*).
Machinery utilisation societies :
Popularisation recommended, *Sinha, D. P.* (207).
very Rare, *Sinha, D. P.* (207).
Malfeasance : occurs occasionally, *Atkins*, 65065.
Management :
is by the People, *Atkins*, 65172-5.
Satisfactory, *Atkins*, 65060-2.

MARKETING : (*See also* SALE SOCIETIES *below*.)

Recommended, *Sinha, D. P.* (206-7) ; *Heycock* (219-20) (223) ; *Khan* (451) ; *Roy, S. K.* (464) 68249-50, 68255-60.
Markets recommended, *Sinha, D. P.* (206-7).

Meetings :

well Conducted, *Atkins*, 65078.
Monthly, *Atkins*, 65074-5.
in Vernacular, *Atkins*, 65076.
Utilisation for demonstration and propaganda, agricultural, recommended, *Roy, N. K.* (483).

MEMBERS :

cannot Control their societies, *Heycock* (223) 66678-9.
Education of, *see* EDUCATION *above*.
Middle class youths, attracting of, to agriculture, *see under* **EDUCATION.**

MILK :

Co-operative collection of, *Quinlan*, 66020.
Supply societies recommended, *Khan* (449).

MINORITIES, compulsion on, to come into schemes for joint improvement, recommended, *Sinha, D. P.* (207) ; *Arikshan Sinha* (271) ; *Sethi* (361) ; *Khan* (452) ; *Roy, S. K.* (466) ; *Roy, N. K.* (498).

CO-OPERATION—contd.

Moneylenders : seldom control societies, *Atkins*, 65064.
Municipalities should encourage co-operative societies, *Roy, N. K.* (498).
Non-credit societies :
Recommended, *Sethi* (360-1).
not generally Successful in the past, *Sethi* (360).

NON-OFFICIALS :
Government encouragement advised, *Atkins* (20).
Importance of, *Henry* (5) ; *Sethi* (360) ; *Roy, S. K.* (466) 68281-8.
Interest taken by, not sufficient, *Dobbs* (65).
Landlords should help, *Sethi* (360).
Organisers, honorary, *see below.*

OBJECTS :
Extent of achievement of :
Deterioration in recent years, *Heycock* (220) 66565.
to a Great extent achieved, *Khan* (452).
Not much Success, *Sinha, D. P.* (207).
Not achieved, *Dobbs* (66) 65452-6 ; *Sethi* (361) 67611-6.
Partial Success, *Atkins* (22) 65079, 65176 ; *Arikshan Sinha* (271).
Societies Successful only as loans institutions, *Roy, S. K.* (466).
should be mainly moral and educational, *Roy, N. K.* (492-3).
Officials : have not sufficient Time, *Dobbs* (65-6).
Organisation too narrow, *Roy, N. K.* (484-5) (491-9) 68364.

ORGANISERS :
Honorary :
not Satisfactory, *Roy, N. K.* (495-6).
Work of, *Henry* (5) 64963-7.
Non-officials, *see above.*
Paid, necessary, *Roy, N. K.* (493-4) (496) 68357-65.
Panchayats : inclined to look to their own advantage, *Heycock* (223).
Pasture societies recommended, *Sethi* (358).
Poorest class should be included, *Sinha, D. P.* (207).
Primary societies :
Condition not satisfactory, *Roy, N. K.*, 68354-6, 68364-5.
Numbers increasing, *Henry*, 65001-5.
Supervision by Central Banks necessary, *Roy, N. K.*, 68366-7, 68400-3.
Progress, *see* OBJECTS *above.*
Propaganda, idealistic, necessary, *Roy, S. K.*, 68281-8.
Public Demands Recovery Act, *Heycock*, 66665-8.

PURCHASE SOCIETIES :
Extension recommended, *Sinha, D. P.* (207), *Khan* (452).
Implements, *see above.*
Rural betterment societies advocated, *Atkins*, 65100-1.

SALE SOCIETIES : (*See also* MARKETING *above.*)
Central organisation at first, advised, *Atkins* (21).
Extension recommended, *Sinha, D. P.* (207), *Heycock* (224).
Mismanagement in the past, *Khan* (452).
None exist, *Atkins*, 65177.
Potato society in Bihar a great success, *Heycock* (223) 66591-3.
Scope : should be narrow at first, *Atkins* (21).
Recommended, *Atkins* (21), *Sethi* (358) (360), *Khan* (451).
Schools, *see under* EDUCATION *above.*

SCHOOL TEACHERS :
Assistance of, *Roy, S. K.* (466) (468).
should be Trained to assist the movement, *Roy, N. K.* (497) (499).
Seed distribution recommended.
Seed distribution, *see under* **CROPS AND CROP PROTECTION.**

CO-OPERATION—concld.

Silos recommended, *Sinha, D. P.* (205).
Staff : inadequate, *Atkins* (20), *Sethi* (360).
Subsidiary industries, *see* CO-OPERATION *under* **AGRICULTURAL INDUSTRIES.**
Subsidies from Government recommended, *Khan* (451). (*See* Government *above.*)

SUPERVISION :

by Central Banks of primary societies necessary, *Roy, N. K.*, 68366-7, 68400-3.
Importance of, emphasised, *Heycock* (220) (223-4) 66565, 66742.
Inadequate, *Khan* (452), *Roy, N. K.*, 68365-7.
Necessary, *Henry* (6) 64966-71, 65001, 65022-3.
Necessary as to accounts, *Atkins*, 65063.
Taccavi and co-operation, *see under* **FINANCE.**
Tenants, effect upon, of co-operative movement, *Tuckey*, 66896-7.
Terrorism by smaller landlords : co-operative movement should help ryots to be more independent, *Dobbs* (66).
Thrift should be taught, *Roy, N. K.* (493).

TRAINING :

Demonstrators, *Roy, N. K.* (483-4).
Institutions for training co-operative workers should be maintained by Government, *Roy, N. K.* (493-4) 68357-63, 68368, 68371, 68377-81, 68388-90, 68396-403.
of Officials, etc. by Government recommended, *Roy, S. K.* (466).
Veterinary relief :
Expansion should be undertaken by department, *Quinlan* (121) (123) 65945-7.
Work recommended, *Ghose* (385).
Welfare work in villages recommended, *Atkins*, 65100-1, *Roy, N. K.* (493).
Whole village societies recommended, *Roy, N. K.* (484-5) (491-9) 48357-8, 68382-4.

COTTAGE INDUSTRIES, *see under* **AGRICULTURAL INDUSTRIES.**

COURT OF WARDS, *see under* **DEMONSTRATION AND PROPAGANDA** and **EDUCATION.**

CROPS AND CROP PROTECTION :

Cattle, straying :
Damage to crops serious, *Sethi* (356) 67643.
Fencing, co-operative, recommended, *Sethi* (356) 67643.
Crops recommended, *Khan* (447).
Expert advice necessary, *Arikshan Sinha* (266).
Flood-resisting crops necessary, *Narendra* (409).

FODDER CROPS :

Demonstration recommended, *Sethi* (356).
Difficulty, *Atkins*, 65097-9.
Farms recommended, *Quinlan* (129).
Grass, local perennial (*Anthistiria ciliata*) successfully grown in Chota Nagpur, *Dobbs* (63).
Janera grown, *Arikshan Sinha* (265-6).
Lucerne, a failure at Kanke, *Dobbs*, 65606.
a Promising line of investigation, *Dobbs* (63).
Recommended, *Quinlan* (128), *Heycock* (223), *Arikshan Sinha* (269-70), *Sethi* (356), (358-9) 67607-8, *Ghose* (381-3) (386-7), *Narendra* (409), *Gibson* (418), *Khan* (449), *Roy, N. K.* (487-90).
for Silage recommended, *Quinlan* (128), *Ganga Vishnu*, 65364.
Fuel : rahar, cotton and castor recommended, *Arikshan Sinha* (269-70).
Gram, improved variety introduced in South Bihar, *Dobbs*, 65601.
Groundnut : (*see also under* **DEMONSTRATION AND PROPAGANDA**).
Market, no difficulty as to, *Dobbs*, 65437.
for Reclamation of land, recommended, *Lal* (303).
Recommended, *Ghose* (375-6) (384).
large Scope for extension, *Sethi* (356-7).
Successfully demonstrated, *Dobbs* (56) (63).

CROPS AND CROP PROTECTION—contd.

IMPROVEMENT OF CROPS :

Hemp, sisal : grown at Samabalpur by one cultivator on 1,500 acres, *Dobbs*, 65647-8.
Breeding and selection advocated, *Dobbs* (63).
better Cultivation and manuring advised, *Atkins* (19).
Demonstration, *see under* **DEMONSTRATION AND PROPAGANDA.**
by Experimental farms, *Heycock* (222).
Local investigation necessary, *Dobbs* (63).
Successful efforts, *Sethi* (357).
Indigo, *see under* **MEYRICK.**
Maize under irrigation on early paddy lands recommended, *Sethi* (357).
Market facilities for improved crops necessary, *Ghose* (383), *Roy, N. K.* (487).
New crops :
Central Co-operative Banks should undertake introduction of, *Atkins* (19).
Marketing arrangements necessary, *Roy, N. K.* (487).
Output has decreased, *Arikshan Sinha* (258-9) 66820-1, 66823-4.

PESTS :

Borer causes great damage to sugarcane, *Henry* (4).
Caterpillar causes great damage to rabi crops, *Henry* (4), *Lal*, 67083, 67087.
Inadequate attention has been given to, *Khan* (447).
Research necessary, *Sinha, D. P.* (199).
Profitable crops, *Arikshan Sinha* (266).
Rahar, as supplying a substitute fuel for cowdung recommended, *Sinha, M. S.* (299) 67000-1, 67004-6.

RICE :

Area, *Dobbs*, 65712-3.
Cost of cultivation Rs. 8 or Rs. 10 per bigha, *Sinha, M. S.*, 67010.
Cultivation, *see under that main heading.*
Dahia variety successfully adopted, *Dobbs* (63) 65614-5, *Ghose* (384).
Demonstration, *see under* **DEMONSTRATION AND PROPAGANDA.**
as Fodder, *see under* FODDER *under* **ANIMAL HUSBANDRY.**
Hulling, *see under* **AGRICULTURAL INDUSTRIES.**
Improved varieties introduced, *Dobbs*, 65601, 65617-20.
Improvement of, *Sethi*, 67581-2.
Kanke Farm, cultivators have taken small quantities of seed, *Dobbs*, 65656.
the Main crop in Orissa, *Sethi* (357).
PAPER, *see under* **AGRICULTURAL INDUSTRIES.**
Poor crops, *Dobbs*, 65557.
Sandha disease severe in Chota Nagpur, *Dobbs*, 65639-46.
Sugarcane on paddy land, *Dobbs*, 65553, 65601.
Yield varies in different localities, *Dobbs*, 65649-50, *Sinha, M. S.*, 67007-8.
Root crops :
Encouragement by Government recommended, *Roy, N. K.* (488).
Food tests recommended, *Roy, N. K.* (488).

SEED DISTRIBUTION :

Arrangements necessary, *Ghose* (383).
Co-operative :
Central Co-operative Banks should undertake, *Atkins* (19).
Godowns stocked by Government recommended, *Roy, N. K.* (487).
Recommended, *Dobbs*, 65616; *Prasad*, 66371-4; *Heycock* (222); *Arikshan Sinha* (266) (270); *Ghose* (384); *Khan* (441) (446) 68217-8; *Roy, S. K.* (463).
on Credit suggested, *Arikshan Sinha* (258).
Farms recommended, *Heycock*, 66715-7.
Free, for demonstration, recommended, *Sethi* (356).
Methods, *Sethi*, 67583-6.
Middle class youths should be encouraged to take to farming, *Sethi* (356).

CROPS AND CROP PROTECTION—contd.

SEED DISTRIBUTION—*contd.*

Necessary, *Arikshan Sinha* (258).
Organisation necessary, *Roy, N. K.* (487).
by Selected cultivators, *Dobbs*, 65616.
Sugarcane, *see below.*
Village farms recommended, *Sethi* (356).
Work done, *Sethi*, 67564-5.
Soybeans :
no Market for, *Dobbs*, 65437.
Suggested for uplands of Chota Nagpur, *Dobbs* (63-4).
Statistics, *see* Seasonal Crop Statistics *under* **STATISTICS.**

SUGARCANE :

Ammonium sulphate used, *Sethi* (352) 67553-60, 67600-2.
Area has possibly decreased slightly, *Dobbs*, 65529-31, 65626-30.
Borer, *Henry* (4).
Bhoorli variety : has deteriorated, *Henry* (1).
Capital cost of a 200 acre farm in North Bihar, *Meyrick* (504-A).
Capital required for, *Arikshan Sinha* (266) 66804-5.
Coimbatore :
Replacing local Bhoorli, *Henry* (1-2) 64930-3.
Supplanting indigenous varieties, *Atkins* (19) 65045-9.
213 :
Successful, *Sethi*, 67553-62, 67581.
Successfully demonstrated, *Dobbs* (56) (63) 65601.
Cost of Production :
to European Planters in North Bihar, *Meyrick* (504-A).
to a Ryot in North Bihar, *Meyrick* (504-A).
Cutting : December to April, deteriorates after 48 hours, *Henry*, 64972-4, 64987.
Deterioration, *Meyrick*, 68127-9.
Demonstration and Propaganda, *see under that main heading.*
Dowlatpore Agricultural Concern, *see under that main heading.*
Extension, scope for, *Meyrick* (429-30) 68102-33, 68180-3.
Gur : *see under* **AGRICULTURAL INDUSTRIES.**
Lohat Sugar Works, *see under* **HENRY.**
Manufacture, *see under* **AGRICULTURAL INDUSTRIES.**
Manure necessary, *Meyrick*, 68130-2.
Marketing, *see under that main heading.*
on Paddy land, *Dobbs*, 65553, 65601.
Price, *see under* SUGARCANE *under* **MARKETING.**
Pusa canes :
Distributed, *Henry*, 64981-2, 64988.
Very much better than indigenous, *Ganga Vishnu* (38) 65275, 65295-300.
Research, *see under that main heading.*
large Scope for extension, *Sethi* (356-7).
Seed :
Distribution, *Dobbs*, 65545.
Dowlatpore Agricultural Concern makes loans of cane setts to cultivators, *Atkins*, 65187-9.
Pusa cane setts, advanced without interest by Lohat Sugar Works, *Henry*, 64981-2, 64992-3, 64998-9, 65035.
Sipaya, chief sugarcane station, not suitable, *Dobbs*, 65657-60.
Sugar Bureau at Pusa, *Dobbs*, 65406, 65661.
Supply, insufficient, *Henry*, 64975.
Recommended, *Ghose* (375-6) (384).
Sugar tariffs, *see under* **TARIFFS AND SEA FREIGHTS.**
Yield :
Limited by crushing facilities, *Dobbs* (70).
Meyrick, 68138-42, 68147-50, 68151-8.
10 tons of cane per acre as compared with 50 or 60 in Java, *Dobbs* (70).
Sugar beet unsuccessful, *Henry*, 64983-4.
Testing of improved varieties by Parnell's method, *Dobbs*, 65621-2.
Varieties cultivated, *Arikshan Sinha* (265-6).

CROPS AND CROP PROTECTION—concld.

WHEATS, Pusa :

Cultivation of, advised, *Atkins* (19).
Demonstration and propaganda, *see under that main heading.*
a Failure, *Arikshan Sinha* (258) (260) (266) 66832-3.
Soils must first be improved, *Atkins* (19) 65238-42.

WILD ANIMALS, DAMAGE BY :

Afforestation in villages, will increase, *Arikshan Sinha* (270).
Fencing recommended, *Khan* (447).
Gun licenses should be more freely granted, *Ghose* (384), *Narendra* (410), *Khan* (447), *Roy, N. K.* (487).
Imperial research recommended, *Sethi* (356-7).
Importance of (266), *Khan* (447).
near Jungles, *Sethi* (356).
Jungle clearing recommended, *Heycock* (222).

CULTIVATION :

Expenses, *Henry*, 65017-9, *Sinha, M. S.*, 67010.
Methods of ryots give poor but constant return, *Henry* (4).
Ploughing of common pastures recommended, *Ghose* (386), *Roy, N. K.* (489-90).
Poverty leads to poor results, *Henry* (4) 64951-2.

RICE : (*See also under* **CROPS AND CROP PROTECTION.**)
Ammonium phosphate recommended, *Dobbs* (62).
Broadcasted, *Sethi* (357).
Cost, *Sinha, M. S.*, 67010.
Green manure, *see under* **FERTILISERS.**
Hand weeding, *Sethi* (357).
Improvement, *Sethi*, 67581-2.
the Main crop in Orissa, *Sethi* (357).
Pastures on paddy fields, *Arikshan Sinha* (267).
Second crop not usually taken, *Sethi* (357).

ROTATIONS :

in uplands in Chota Nagpur, *Ghose* (384).
Demonstration recommended, *Sethi* (357).
European, recommended, *Khan* (447).
Financial obstacle to fallowing, *Henry* (4).
Improvement, *Atkins* (19) 65163.
None in Orissa, *Sethi* (357).

CULTIVATORS, *see under* **DEMONSTRATION AND PROPAGANDA.**

DAIRYING, *see under* **ANIMAL HUSBANDRY.**

DEBT, *see under* **AGRICULTURAL INDEBTEDNESS.**

DEMONSTRATION AND PROPAGANDA :

Adult education, should be conterminous with, *Roy, S. K.* (458).

AGRICULTURAL ASSOCIATIONS :

at Barh, *Khan*, 68212-21.
Failed, *Arikshan Sinha* (258) (260) 66825-6.
Sub-divisional, recommended, *Arikshan Sinha* (258).
at Tirhut, *Arikshan Sinha* (258) (271).
Utilisation recommended, *Khan* (440) (443) (450-1) (453) 68192, 68203-9.
Charts may be of use, *Sinha, D. P.* (202).
Cinema recommended, *Sinha, D. P.* (202), *Khan* (444).
Comparative demonstrations of improved and old methods recommended, *Roy, N. K.* (483).
Continuous demonstration, advocated, *Henry* (2).

DEMONSTRATION AND PROPAGANDA—contd.

Co-operative :

of Fertilisers recommended, *Ghose* (383).
Farms, recommended, *Atkins* (15).
Institutions, important work of, *Prasad* (160) 66306-11, 66371-4, 66426-30.
no Provision for, *Arikshan Sinha* (270).
Recommended, *Sethi* (351) 67563, *Ghose* (375-6), *Khan* (440), *Roy, S. K.* (458-9), *Roy, N. K.* (483-4) (493) 68382-99.
Subsidies from Government, recommended, *Roy, N. K.* (483-4).
Training of workers necessary, *Roy, N. K.* (483-4).

Court of Wards :

Estates should be used for demonstration and education, *Sethi* (159) (351).
Model farm at Bettiah, *Heycock*, 66703.

Cultivators :

Adopting improved methods, *Dobbs* (56) 65546, 65553, 65613.
Confidence destroyed by unsuccessful demonstration, *Sinha, D. P.* (197-8).
Conservative, *Henry* (2) 64930, 65039-40; not conservative, *Atkins*, 65047-9, 65154-5.
Department has not sufficient touch with, *Dobbs*, 65623-5.
Suspicious of innovations, *Heycock* (219).
Sympathy with necessary, *Khan* (440) (443).
Willing to accept advice, *Heycock* (219), *Ganga Vishnu* (38).
on Cultivators' own fields recommended, *Henry* (2), *Atkins* (17), *Dobbs* (56), *Ganga Vishnu* (38), *Prasad* (160), *Sinha, D. P.* (201-2), *Heycock* (219) 66647, 66711, *Sethi* (351-2) 67563, *Ghose* (375), *Roy, N. K.* (483-4).
Danger of demonstration before improvement is proved to be successful, *Heycock* (219).

Decorations (*honours*) :

for Capitalist agriculturists, recommended, *Khan* (453).
for Landowners taking an interest in animal husbandry, recommended, *Roy, N. K.* (490).
Recommended, *Quinlan* (129) 65813-5, *Heycock*, 66563, 66718-20.
Demonstration among zamindars and non-official co-operative workers, *Dobbs* (56).

Demonstrators :

Experts, in each sub-division, recommended, *Arikshan Sinha* (258).
Training at provincial farms recommended, *Sinha, D. P.* (200).

Expert Advice :

Cultivators will accept if it is simple and demonstrably effective, *Dobbs* (56).
should be Free and given in villages, *Atkins* (17).
Exhibitions recommended, *Sinha, D. P.* (202).

Failures :

Instances of, *Ghose* (376).
does not Know of any, *Heycock* (219) 66714.
in Kutey village, *Roy, N. K.* (484).
at Muzaffarpur, *Arikshan Sinha* (260).
Fairs, propaganda at, unsuccessful, *Sinha, D. P.* (202).

Farms :

for Cattle breeding recommended, *Quinlan* (129).
Control by Agricultural Department assisted by private agencies and co-operative societies, *Sethi* (351).
Co-operative, advocated, *Atkins* (15).
Cultivator demonstrators should be in charge, *Sethi* (351).
Departmental :
Extension recommended, *Dobbs*, 65543-6.
Recommended, *Heycock* (218-9) (222) 66643-6, 66715-7, 66723, 66774-6.

DEMONSTRATION AND PROPAGANDA—contd.

FARMS—*contd.*

Successful, *Dobbs* (56).
should Distribute seeds, manures, implements, etc., *Sethi* (351).
of Doubtful utility, *Sinha, D. P.* (201).
for Education recommended, *Atkins* (16) 65183-4, *Ganga Vishnu* (38).
for Fodder crops recommended, *Quinlan* (129).
Kanke farm : cultivators have taken small quantities of paddy from, *Dobbs*, 65656.
Necessary, *Narendra* (407-8).
at Patna failed, *Khan* (443).
Sabour farm, *see under* **EDUCATION.**
School farms, *see under* **EDUCATION.**

SIPAYA FARM :

Cattle Committee recommended that it should be used for buffalo breeding, *Dobbs*, 65662-3.
Heycock, 66774-5.
chief Sugarcane station, *Dobbs*, 65657-60.
not Suitable, *Dobbs*, 65657-60, 65701-7.
in each important Village, suggested, *Sethi* (351) 67630-2.
Fertilisers, *see* DEMONSTRATION *under* **FERTILISERS.**
Field demonstrations :
strict Control necessary, *Dobbs* (56).
Recommended, *Arikshan Sinha* (259-60), *Khan* (443), *Roy, S. K.* (458).
Fodder crops, demonstration of, recommended, *Sethi* (356).
Funds, sufficient, *Dobbs*, 65398.
Groundnut : successfully demonstrated, *Sinha, D. P.* (202); in Khunti sub-division of Ranchi district, *Ghose* (375); in Chota Nagpur, *Heycock* (219).
Honorary workers recommended, *Prasad* (160).
Implements, *see under that main heading.*
Improved methods, etc., cost difficulty, *Narendra* (408).
Improvements, *Heycock*, 66714, 66721-2.
Indigenous methods recommended, *Khan* (440-1).
Inspectors of Agriculture, criticism of, *Foley* (225).
Landlords should help, *Sethi* (351), *Khan* (443).
Leaflets, of little avail, *Prasad* (160), *Sinha, D. P.* (202).
Lectures :
of Little avail, *Prasad* (160).
Recommended, *Arikshan Sinha* (260).
Local demonstration recommended, *Heycock* (218-9), *Arikshan Sinha* (258).

MEETINGS :

of Co-operative societies should be utilised, *Roy, N. K.* (483).
Recommended, *Sinha, D. P.* (202).
found Successful, *Atkins* (16-17) 65156-7.
Non-co-operation movement, effect of, *Arikshan Sinha* (260).
North Bihar, practically not touched, *Dobbs*, 65702-7.
Obstacles : cultivators' fear, *Dobbs* (56).
Pamphlets, found successful, *Atkins* (17) 65156-60.
Personnel, importance of, *Sinha, D. P.* (202).
Planters, European : useful example, *Atkins*, 65152-7.
Posters may be of use, *Sinha, D. P.* (202).
Practical demonstration advocated, *Ganga Vishnu* (38) 65275-7, 65295.
Produce rent system discourages cultivators from adopting improvements, *Heycock*, 66691-7. (*See under* **LAND TENURE.**)
Profits, possibility of increasing, should be demonstrated, *Narendra* (407-8).
Programme, must be definite, *Prasad* (160).
Pusa Research Institute : should do local demonstration and propaganda, *Atkins*, 65148-52, 65161.

RICE :

Dahia variety successfully demonstrated, *Sinha, D. P.* (202), *Heycock* (219).
Indrasail variety successfully demonstrated, *Sinha, D. P.* (202).
Rotation, recommended, *Sethi* (357).

DEMONSTRATION AND PROPAGANDA—concld.

Simplicity, importance of, *Khan* (443).
Small scale recommended, *Meyrick*, 68144-6.
Staff, *see under* **AGRICULTURAL DEPARTMENT.**
Successful demonstrations, *Sethi* (352) 67581-2, *Roy, N. K.* (484).
Successful demonstration by Peloul Co-operative Society, *Roy, N. K.* (484).
Sugar Bureau, *see under* **RESEARCH.**
SUGARCANE: (*See also under* **CROPS AND CROP PROTECTION.**)
Coimbatore varieties, successfully demonstrated, *Heycock* (219).
Research, *see under that main heading.*
Successfully demonstrated, *Roy, S. K.* (459).
in Khunti sub-division of Ranchi district, *Ghose* (375).
at Pusa, *Ganga Vishnu* (38) 65275-7, 65295-7.
Successful propaganda of improved varieties, *Atkins*, 65153, 65161-2.
Vernacular recommended, *Khan* (443).
Welfare, should be connected with, *Roy, S. K.* (458) (460).
Wheat: (*See also under* **CROPS AND CROP PROTECTION.**)
Wheat:
Pusa 12 successfully demonstrated, *Sinha, D. P.* (202).
Successful demonstrations at Pusa, *Ganga Vishnu* (38).

DISEASE, *see* CONTAGIOUS DISEASES *under* **VETERINARY** *and see* **WELFARE OF RURAL POPULATION.**

DISPENSARIES, *see under* **VETERINARY** *and* **WELFARE OF RURAL POPULATION.**

DISTRICT BOARDS, *see under* **CO-OPERATION.**

DOBBS, A. C., Director of Agriculture, Bihar and Orissa (48-117).
Past appointments, 65371-2, 65501-2 (114).

ADMINISTRATION:

Central organisation of scientific and technical consultants advocated (56-7).
Development Board, meets three or four times a year, 65651-5.
Experts, scientific, should be controlled by scientific officers of calibre of Fellows of the Royal Society (57) 65401 (110-3) 65470-4, 65475-6.
General administrative officer required (58).
Lac association, 65495-500.
Organisation, all-India, for improving agriculture in general, 65495-500.
Partition of Bengal effect on Agricultural Department of, 65682-9.
Pusa:
Climate, not suitable for post-graduate training, 65384-9.
Gangetic alluvium, importance of (113).
Provincial work (57) 65592-4, 65402-10.
Research should be emphasized, 65569-70.
Sugar Bureau at Pusa, 65406, 65661.
Transport:
Railways:
Passenger trains lose time (58).
Pilfering excessive (58) 65554-5.
not Satisfactory (58).
Roads: Maintenance should be better (58).

AGRICULTURAL DEPARTMENT:

Agricultural Adviser, proposed status of, 111-3.
Assistant Directors:
Qualification: B.Sc., with Honours, 65564-5, 65674-81 (114-7.)
farm Training, 65463-6, 65587-94, 65674-81.
Board of Agriculture: wide constitution proposed (112).
Botanical Section: should be transferred from Sabour to Patna (49) (114-6).
Chemical Section:
Expenditure, considerable increase not advocated (53).
should be Transferred from Sabour to Patna (49) (115).
Staff inadequate (53).

DOBBS, A. C.—contd.

AGRICULTURAL DEPARTMENT—*contd.*

Civil administration: in touch with, 65623-5.
Cultivators, insufficient touch with, 65623-5.
Director of Agriculture, appointment of outsider suggested (50-1) 65379-82.
Economic Botanist, appointment might be abolished (115).
Finance (50).
Forestry Department, question of co-operation with, has not arisen, 65445.
Legislative Council: hostile attitude of, 65682-9.
North Bihar, practically not touched, 65702-7.
Organisation (49-53).
Partition of Bengal, effect on, of 65682-9.
Scientific work might be controlled by University, 65475-7 (114-7)
Services: should be restricted to field, steading and workshop (49).
Staff:
Agricultural College to train recruits, question of, (55) 65396.
Inadequate (51-2) 65532-46, 65623-5, 65686-9.
Recruitment:
Difficulty (110).
in the Province, 65563-4.
Subordinate Service:
Pay, 65595.
Trained on central farms, 65596-600 (115).
Training at Sabour Farm (116).
Recruitment:
from Cultivating classes advised (56).
Difficulty, 65398.
Sugar Bureau at Pusa, relations with, 65661.
Superior Provincial Agricultural Service:
training of probationary Assistant Directors, 65383-9.
Transfers of officers not too frequent, 65610.
Work done, 65601, 65615.

AGRICULTURAL INDEBTEDNESS:

Causes of borrowing: vicissitudes of agriculture and increased personal expenditure (58-9).
Contracts relating to land or buildings, suggestions as to (59) 65695-700.
Measures for lightening agriculture's burden of debt:
Cessation of public borrowing advocated (59).
Development funds (59) 65422-6, 65525-6.
Towns drain away rural wealth (59).
Transfer of land should be facilitated (59).

AGRICULTURAL INDUSTRIES:

Advice, Government should supply scientific but not technical (64).
Catalogue of economic products suggested (64).
Extension advised (64) 65527.
Finance: by Government on debentures advised (64).
Gur:
Indigenous methods of production, wasteful (70).
Price has fallen 65529-31, 65626-30.
Lac Association, 65495-500.
Poultry rearing: Government should give information but not financial assistance 65719-20.
Soybeans should be investigated (64).
Spinning, 65528.
Sugar, white, manufacture (70-9) 65690-4, 65717-8.
Weaving, 65528.

AGRICULTURAL LABOUR:

Attracting labour to areas where there is a shortage:
improved Communications (64-5).
Experimental farms to determine most profitable crops (64-5).

DOBBS, A. C.—contd.

AGRICULTURAL LABOUR—*contd.*

Development of uncultivated land :
Cattle breeding (65).
Cultivation, demonstration of methods (65).
Gaya uncultivated land, 65444.
Scope for, 65400.

ANIMAL HUSBANDRY :

Buffalo breeding : Cattle Committee recommended that Sipaya should be used. 65662-3.
Cattle Breeding :
not Commercially profitable, 65562.
for Export, 65491-4.
Holstein bulls, cross-breeding with Indian Stock advised (63) 65486-8.
for Milk chiefly, 65664-7.
Cows, feeding of, 65489-90.
Fodder : leaves used, 65561-2.
Grazing grounds :
Dwindling (63).
Price of bullocks increasing because of scarcity of grazing grounds, 65668-9.
Local conditions : breeding must be adapted to (64).
Military Department's experience and breeding work should be utilised (63-4).
Price of bullocks increasing, 65668-9.
Stall feeding advised (63) 65493-4.

CAPITAL, ATTRACTING OF, TO AGRICULTURE :

Difficulty of making farming profitable when paying for labour (53-5) 65399.

CO-OPERATION :

Credit societies :
Borrowing by members excessive (65) 65452.
Indebtedness of members increasing (65).
merely Lend at lower rates of interest than moneylenders (65).
Irrigation works : Government assistance necessary (66).
Non-officials : not taking sufficient interest (65).
Objects not achieved (66) 65452-6.
Terrorism by smaller landlords : co-operative movement should help ryots to be more independent (66).

CROPS AND CROP PROTECTION :

Fodder crops :
Grass, local perennial (Anthistiria ciliata) successfully grown in Chota Nagpur (63).
Lucerne, a failure at Kanke, 65606.
a Promising line of investigation (63).
Gram, improved variety introduced in South Bihar, 65601.
Groundnut :
Market, no difficulty as to, 65437.
Successfully demonstrated (56) (63).
Hemp, sisal : grown at Samabalpur by one cultivator on 1,500 acres, 65647-8.
Improvement of crops :
Breeding and selection advocated (63).
Local investigation necessary (63).
Rice :
Area, 65712-3.
Dahia variety successfully adopted in South Bihar (63) 65614-5.
Improved varieties introduced, 65601, 65617-20.
Kanke Farm, cultivators have taken small quantities of seeds from, 65656.
Poor crops, 65557.
Sandha disease severe in Chota Nagpur, 65639-46.
Yield varies in different localities, 65649-50.

DOBBS, A. C.—contd.

CROPS AND CROP PROTECTION—*contd.*

Seed distribution :
Co-operative, 65616.
by selected Cultivators, 65616.
Sugarcane, 65545.
Soybeans :
no Market for, 65437.
Suggested for uplands of Chota Nagpur (63-4).
Sugarcane :
Area has possibly decreased slightly, 65529-31, 65626-30.
Co. 213 successfully demonstrated (56) (63) 65601.
Gur : *see under* **AGRICULTURAL INDUSTRIES.**
Manufacture of white sugar in India (70-9) 65690-4.
on Paddy land, 65553, 65601.
Seed distribution, 65545.
Sipaya, chief sugarcane station, not suitable, 65657-60.
Sugar Bureau at Pusa, 65406, 65661.
Yield :
Limited by crushing facilities (70).
Ten tons of cane per acre as compared with 50 or 60 in Java (70).
Testing of improved varieties by Parnell's method, 65621-2.

DEMONSTRATION AND PROPAGANDA :

Cultivators :
Adopting improved methods (56) 65546, 65553, 65613.
Department has not sufficient touch with, 65623-5.
on Cultivators own land, successful (56).
Demonstration among zamindars and non-official co-operative workers (56).
Expert advice : cultivators will accept if it is simple and demonstrably effective (56).
Farms, departmental :
Extension recommended, 65543-6.
Successful (56).
Field demonstrations : strict control necessary (56).
Funds, sufficient, 65398.
Kanke Farm : cultivators have taken small quantities of paddy from, 65656.
North Bihar, practically not touched, 65702-7.
Obstacles : Cultivators' fear (56).
Sipaya farm :
Cattle Committee recommended that it should be used for buffalo breeding, 65662-3.
chief Sugarcane station, 65657-60.
not Suitable, 65657-60, 65701-7.

EDUCATION :

Agricultural :
Careers, after, of students : service with Government and private proprietors (55-6) 65397.
College for the Province, question of re-opening, and location of, (55) 65395, 65566-7.
Colleges :
Practical training advised, 65457-62, 65673.
of little Use, 65372, 65504-21, 65568, 65670-81.
Incentives: service with Government and private proprietors (55).
Post-graduate training : Bangalore preferable to Pusa in view of climate, 65384-9 (116-7).
Practical illustration advised (66-7) 65395.
Pupils not mainly drawn from agricultural classes (56).
not Satisfactory, 65390-1 (114-5).
Scope for employment of educated persons on the land should be enlarged (67).
Teachers :
should preferably be drawn from Agricultural classes, (55).
Shortage if agricultural college is started (55).
Technical training (56).
in Vernacular advised (66) 65393-4.

DOBBS, A. C.—contd.

EDUCATION—*contd.*

Assistant Directors : farm training, 65463-6, 65519.
Engineering College :
Affiliated to University, 65585.
might be Transferred from Patna to Sabour (116).
English education generally a failure (66) 65393-4, 65467-9.
Medical College, 65586.
Middle class youths, attracting to agriculture :
Difficulties (53-4) 65547-52.
Income from agriculture must be increased (55), 65399.
School gardens advocated (55).
Patna University :
Chemical research advocated (115).
Correlation with Veterinary College farm advised (115).
should be Equipped to assist territorial officers (49) (52) 65373-5.
Progress, 65580-6.
Rural education faculty advised (116).
Sabour Agricultural College :
was not Affiliated to University, 65393-4, 65467-9, 65573, 65670-1.
Attendance in second year was not full (55).
Closed (55) 65392, 65467-9, 65503, 65573-86, 65670-2 (117).
Sabour Farm :
Facilities (116).
Subordinate staff training advised (116).
University, all-India, proposed (111).

FERTILISERS :

Adulteration : should be made penal (62).
Ammo-phos introduced, 65601-2.
Ammonium phosphate:
Good for paddy (62).
Marketing organisation necessary, 65449, 65558-9.
Ammonium sulphate :
Ignorance of experiments in other Provinces, 65435-6.
Increased use of (56) (62-3) 65601.
Artificial :
Free limited supply suggested (62).
Price difficulty (62).
Bones, prejudice against (62) 65434.
Cowdung, use of as fuel : most farmyard manure is burnt, 65556.
Demonstration advised (62).
Di-ammo-phos to be tried, 65608.
Experiments advised (62-3).
Farmyard manure, demonstration suggested (62).
Green manure : difficulty, 65560.
Gypsum, successfully used for groundnut (63) 65611-2.
Leaves (87) 65561.
Oilcakes : Extensively used (62).
Storage facilities necessary (62).

FINANCE :

Government loans on holdings advocated (58) 65411-21, 65478-85, 65525-6.
Improvements should be financed from revenue (59) 65422-6.
Irish Land Purchase Acts, example of (58) 65481-3.
Registration of contracts as to real property suggested (58).
Taxation of incomes secured by law on contracts, advocated (59) 65695-700.

FORESTS : grazing : a difficult question, 65447,

HOLDINGS :

Consolidation :

Advances might be made to purchasers of fragments (60).
Legislation suggested (60).

DOBBS, A. C.—contd.

HOLDINGS—*contd.*

Obstacles to:
Inheritance laws (60).
Narrow outlook of cultivators (60).

IMPLEMENTS:

Cliff, Deputy Director in N. W. Bihar, work of, 65438.
Mass production, difficulties of, 65439-41.
Ploughs, improvement of, 65438.

IRRIGATION:

Kanke *bundhs* advocated (60-2).
Minor works:
small Canals (60).
Contour embankments (60).
Obstacles:
Apathy of landlords (60) 65432-3, 65522-4
Fixed cash rents, 65522-4.
Inheritance laws, 65522.
Smallness of holdings (60).
Overseers should be appointed, 65427-31.
Son canal area waterlogged, 65626-30.

LAND TENURE:

Inheritance laws: discourages improvements, 65522-4
Permanent settlement discourages improvements, 65522-4.
Rental value of land: about 50 per cent of the produce, 65478-85.
Rents, fixed cash, discourage improvements, 65522-4.

MARKETING:

Ammonium sulphate: marketing organisation necessary, 65449.
Facilities: 65448-51.
Survey not attempted, 65448.

RESEARCH:

Administration (49-53).
Agricultural Adviser, proposed status of (111-2).
Continuity preserved, 65603-10.
Control of scientific work:
by Scientific officers of calibre of Fellows of the Royal Society (57) 65401, (110-3). 65470-4, 65475-6.
by University suggested, 65475-7.
Co-ordination:
McKerral's proposals (110-1).
inter-Provincial, instance of lack of, 65435-6.
of Scattered workers difficult (110).
Finance should be constant (52).
on Garden produce, inadequate (52).
Oil, research into transport difficulties would be valuable (53).
Patna University: should be Equipped to assist territorial officers (49) (52) 65373-5.
Pusa:
Provincial Specialist officers not sent to, 6535-6.
Research side should be emphasised, 65569-70.
Records kept of failures as well as successes, 65603-5.
Recruitment: difficult to get men of proved ability (110-1).
Scientific Commissioner suggested (50-1) 65376-8.
University, all-India, proposed (111-2).
Vegetable protein, research as to digestibility recommended (53).
Waste heat, Second Law of Thermodynamics in relation to (53).

DOBBS, A. C.—concld.

RESEARCH—*contd.*

SOILS :

Erosion is the cause of poor soil in uplands of Chota Nagpur (61).
Kanke farm : marked improvement (62).
Phosphates, areas deficient in, 65634.
Surveys : 65639-34.

STATISTICS :

Based upon guesses, 65708-16.
Director of Agriculture in charge of, 65708-16.
Officer, whole-time :
no definite advance possible without appointment of,
Expenditure, doubtful if justifiable (69).
Seasonal crop statistics :
Checking by sampling necessary (68).
Worthless (68) 65626-9, 65708-16.

VETERINARY :

Department :

should be Independent of agricultural Department, 65442-3.
Legislative Council's appreciation of, 65684.
Inoculation : Religious prejudice overcome, 65684.

WATERLOGGING :

Son canal area waterlogged, 65626-3 .

WELFARE OF RURAL POPULATION :

Administrative machinery insufficient (68).
Diet : investigation suggested (67-8).
Officer of Provincial Civil Service should be posted to each thana to act as a focus for all local interests (68).
Organisation, rural : active campaign suggested (48-49) 65532-46.
Population (48).
Poverty :
Based on physical conditions (67).
Cumulative (48).
Terrorism of ryots by smaller landlords (56) (66).

DOWLATPORE AGRICULTURAL CONCERN : *see under* **ATKINS.**

DRAINAGE *see under* **SOILS.**

EDUCATION : (*see also under* **LAMBERT AND BLAIR**).

ADULT :

Cinema recommended, *Ghose* (374).
Co-operative agency recommended, *Prasad* (160) 66306-11 ; *Ghose* (374) (385).
Demonstration farms advocated, *Atkins* (16) 65183-4, *Ganga Vishnu* (38).
Difficulty of, *Prasad* (160).

Evening Schools :
District boards should manage, *Sinha, D. P.* (201).
Recommended, *Sinha, D. P.* (201), *Khan* (442).
Finance, from district boards, recommended, *Prasad* (160).
an Indirect method of teaching children, *Heycock* (218).
Object, to remove illiteracy, *Prasad*, 66453.
Peripatetic lectures recommended, *Khan* (442-3).
Practical agricultural demonstration recommended, *Sethi* (351).
Practical training by short courses on farms recommended, *Heycock* (218).
Propaganda recommended, *Khan* (442).

EDUCATION—contd.

AGRICULTURAL :—*contd.*

ADMINISTRATION OF :

by Central Co-operative Banks advocated, *Atkins* (16) 65193-4.
by Managing committees representing district boards, Agricultural and Co-operative Departments and the peasant class, recommended, *Prasad* (160) 66376.
Agricultural classes, small percentage of, in schools and colleges *Dobbs* (56), *Heycock* (218), *Sethi* (350), *Khan* (442), *Ghose* (394), *Roy, S. K.* (457).
Attendance disappointing, *Khan* (442) (453). (*See* also below).
Bias recommended, *Prasad* (168), *Sinha, D. P.* (199) (207).
Careers, of students :
Employment, scope for, of educated persons on the land should be enlarged, *Dobbs* (67).
Farming, often, *Ganga Vishnu* (37).
Farming, none, *Sethi* (350), not as a rule, *Foley* (225).
Few openings for, *Khan* (442).
Government service, Heycock (217-8) 66554-7, 66638-42, 66727, *Dobbs* (55-6), *Sethi* (350), *Khan* (442).
not on the Land, *Narendra*, 67873.
Private proprietors, service with, *Dobbs* (55-6).
Agricultural College, provincial, question of re-opening of :
Affiliation to University, *Heycock*, 66725-6.
Entrance qualification, Heycock, 66728-30.
Location of, etc., *Dobbs*, (55), 65395, 65566-7.
Necesary, *Khan* (442) 68193-5.
Not recommended, *Sinha, D. P.* (200).

Colleges :

Practical training advised, *Dobbs*, 65457-62, 65673.
of little Use, *Dobbs*, 65372, 65504-21, 65568, 65670-81.
Co-operative management recommended, *Prasad*, 66376.
Demand :
Great, *Ganga Vishnu* (38).
Greater than supply, *Roy, S. K.* (457).
None, *Atkins*, 65170.
should be Stimulated, *Atkins*, 65170-1.
Employment, scope for, of educated persons on the land should be enlarged, *Dobbs* (67) (*See also* Careers *above.*)
Experiments to be made, *Fawcus* (316).
Extension advocated, *Roy, S. K.* (457).

Farms :
Co-operative demonstration, advocated; *Atkins* (15), *Ganga Vishnu* (41).
Provincial, should undertake agricultural education, *D. P. Sinha* (200).
Field excursions recommended, *Sinha, D. P.* (199).
Government recognition necessary, *Sinha D. P.* (207).
Importance of, *Roy, S. K.* (467-8.)
Incentive :
Agricultural Department, hope of employment in, *Sinha, D. P.* (200).
Employment, hope of obtaining, *Heycock* (217).
Government service, hope of obtaining employment in, *Atkins* (16), *Dobbs* (55), Foley (225), *Sethi* (350), *Roy, S. K.* (457).
Indigenous methods recommended, *Narendra* (407).

Institutions :
Absence of, in Begusarai and Samastipore, *Atkins* (15).
Insufficient, *Ganga Vishnu* (37), *Arikshan Sinha* (259), *Khan* (441-2), *Roy, S. K.* (457).
not Popular, *Sinha D. P.* (201).
in Middle schools, recommended, *Ganga Vishnu* (41), *Arikshan Sinha* (271), *Sethi* (350), *Khan* (452), *Roy., S. K.* (468).
Post-graduate training :
Bangalore preferable to Pusa in view of climate, *Dobbs*, 65384-9 (116-7).
at Pusa, America or Denmark, recommended, *Sinha, D. P.* (200).
Practical, recommended, *Dobbs* (66-7) 65395, *Narendra* (407), *Khan* (442), *Roy, S. K.* (468).

EDUCATION—contd.

AGRICULTURAL—*concld.*

in Primary schools:
as a Compulsory subject, recommended, *Khan* (452).
Recommended, *Ganga Vishnu* (41), *D. P. Sinha* (199), *Arikshan Sinha* (271).
Revenue officers, training in technical agriculture suggested, *Heycock*, 66556-7, 66638-42.
Sabour Agricultural College, *see below.*
not Satisfactory, *Dobbs*, 65390-1 (114-5).
in Secondary schools should be an optional subject, *Sinha, D. P.* (200).
Schools: (*See also below.*)
Costly and unpopular, *Sinha, D. P.* (199).
None exist, *Prasad*, 66376, Roy, S. K. (457).
Recommended, *Prasad*, (159-60) 66376-9.
Required in every sub-division, *Arikshan Sinha* (259).
in Schools recommended, *Ghose* (394-5), *Khan* (442-3).
Short courses for sons of landlords recommended, *Khan* (442).
Stipends, etc., for boys of agricultural classes recommended, *Khan* (442).
Subsidiary industries should be taught, *Prasad*, 66377-9.
Teachers: (*See also below.*)
Absence of, in Begusarai and Samastipore, *Atkins* (15).
Agricultural classes, should be drawn from, *Atkins* (15), *Ganga Vishnu* (37), *Dobbs* (55), *Arikshan Sinha* (259), *Khan* (442).
Agricultural Department should supply, *Khan* (443).
Itinerant, recommended, *Khan* (452-3).
Shortage of, if agricultural college is started, *Dobbs* (55).
Supply insufficient, *Ganga Vishnu* (37), *Khan* (442), *Roy, S. K.* (457).
Teaching facilities:
Inadequate, *Ganga Vishnu* (37).
Urgent need of, in Begusari and Samastipore, *Atkins* (15).
Technical training, *Dobbs* (56).
Text books, should be used with caution, *Narendra* (407).
Theoretical, advocated, *Ganga Vishnu* (41).
University, faculty of agriculture recommended, *Sinha, D.* P. (200) 66525, *Roy, S. K.* (457) (468) 68234-5.
in Vernacular advised, *Dobbs* (66) 65393-4.
Vocational teaching, only provision for, is the taking of apprentices at Government demonstration farms, *Roy, S. K.* (457).
Zamindars' sons not attracted owing to land tenure system, *Heycock* (217-8) 66559-62, 66701-7.

ANIMAL HUSBANDRY:

Extension of facilities for training in, advised, *Quinlan*, 66033.
education of villagers in the general Hygiene of livestock, necessary, *Quinlan* (127) 65725.
Assistant Directors of agriculture: farm training, *Dobbs*, 65463-6, 65519, 65587-94, 65674-81.

Attendance:
in Primary schools, *Fawcus* (317-8).
at Sabour Agricultural College: *Dobbs* (55).
in Upper class of schools, poor, owing to:
Compulsion, lack of, *Arikshan Sinha* (271).
early Marriage, *Sinha, D. P.* (208).
Nervous troubles, *Roy, S. K.* (469) 68269-75.
Teachers, inefficiency of, *Roy, N. K.* (499).
boys having to Work, *Sinha, D. P.* (200), *Khan* (442) (453).
Banki Union, compulsory education in, *Fawcus* (317).
Boy scout movement approved, *Roy, S. K.* (466), *Roy, N. K.* (491) (497) (499).
Children: sent to school too young, *Fawcus* (318).

COLLEGE, provincial agricultural: (*See also under* AGRICULTURAL *above.*)

Affiliation to University necessary, *Sethi*, 67543-4.
Required, *Sethi* (350) 67536-44, 67549-52.
Veterinary college, should be linked with, *Sethi*, 67549.

EDUCATION—contd.

COLLEGES:

Agriculture should be taught as a science subject, *Sinha, D. P.* (200) 66525.
Sabour, *see below.*
Compulsory agricultural education, attendance bad owing to lack of, *Arikshan Sinha* (271).
Compulsory education of Zamindars recommended, *Roy, S. K.*, 68251-4.

COMPULSORY PRIMARY EDUCATION:

Act, permissive, in force, *Heycock*, 66595.
Banki Union have adopted, *Heycock*, 66596-7.
Difficulty of enforcing, *Fawcus* (317).
Financial difficulty, *Sinha, D. P.*, 66546-50, *Heycock*, 66595-9.
Necessary, *Sinha, D. P.* (208).
Public opinion re, *Sinha, D. P.*, 66644-50.
Recommended, *Arikshan Sinha* (271), *Narendra* (411), *Khan* (453), *Roy, S. K.* (469), 68251-4; *not* recommended, *Heycock*, 66594-9, *Ghose* (395) 67697-8, 67740, *Roy N. K.* (499).

Co-operative *see under* **CO-OPERATION.**

Court of Wards encourages training of minors, *Heycock*, 66701-7.
Demonstrators of Agricultural Department should be trained at provincial farms, *Sinha, D. P.* (200).
District boards in favour of building schools, to the detriment of other activities, *Heycock*, 66749, 66755-6.

ELEMENTARY: (*See also* PRIMARY *below.*)

Course, not long enough, *Heycock* (224).
Finance: funds indequate, *Heycock* (224).
Illiteracy, relapse into, *Heycock* (224).
Management, committees difficult to find, *Heycock* (224).
Quality, poor, *Heycock* (224).
Schools not adequately supervised, *Heycock* (224).
Teachers:
not very Competent, *Heycock* (224) 66597.
Supply inadequate, *Heycock* (224) 66597.
Urgently needed, *Sethi* (350).
not sufficiently Widespread, *Heycock* (224).
Engineering College:
Affiliated to University, *Dobbs*, 65585.
might be Transferred from Patna to Sabour, *Dobbs* (116).
English necessary for scientific training, *Ross* (339).
English education generally a failure, *Dobbs* (66) 65393-4, 65467-9.
Farms, *see under* AGRICULTURAL *above.*

FINANCE:

Co-operative, advocated, *Atkins* (16).
District boards should contribute, *Prasad* (160).
from Government recommended, *Khan* (443).
Inadequate, *Heycock* (224).
Garjat State, experience of, *Fawcus* (318).
Hygiene: in schools, teaching recommended, *Phillips* (335).
Kamdars should be educated for demonstration at provincial farms, *D. P. Sinha* (200).
Medical College, *Dobbs*, 65586.
Methods, useless for agriculture or trade, *Arikshan Sinha* (271).

MIDDLE CLASS YOUTHS: attracting of, to agriculture:

is the Central agricultural problem in India, *Roy, S. K.* (457).
Colonies recommended, *Prasad* (159-60) 66189-204),
are being Compelled by economic pressure to work on the land, *Ganga Vishnu* (37) 65307-13.
Co-operative:
Farming societies, with Government help, recommended, *Ghose* (374) 67664-76 67732-5.

EDUCATION—contd.

MIDDLE CLASS YOUTHS—*concld.*

Limited liability farming with Government financial help recommended, *Roy, S.K.* (458) 464-5).
Organisation recommended, *Prasad* (159).
Court of Wards, land of, should be utilised, *Prasad* (159) (351).
Demonstration that agriculture can be made profitable, recommended, *Ghose* (374) 67664-76, 67732-5, *Roy, S. K.* (458).
Difficulties, *Dobbs* (53-4) 65547-52.
Financial assistance in developing unculti vated land, *Atkins* (16) 65210-37, *Prasad* (159), *Ghose* (374) 67664-76, 67732-5.
Government estates should be utilised, *Prasad* (159).
Grants of land, *Atkins* (16), 65210-37.
Income from agriculture must be increased, *Dobbs* (55) 65399.
Labour-saving machinery, *Ghose* (374) 67664-76, 67732-5.
Land Acquisition Act necessary, *Roy, S. K.* (458).
Obstacle: lack of employment, *Heycock* (218).
Planters' capital requirements, *See under* **CAPITAL, ATTRACTING OF, TO AGRICULTURE.**
Preference for Government appointments should be given to applicants trained in agriculture, *Sinha, D. P.* (200-1) 66519, *Khan* (442).
School gardens advocated, *Dobbs* (55).
Schools, agricultural recommended, *Prasad* (159-60).
Towns drain the villages, *Roy, S. K.* (457).
Training in agriculture, *Atkins* (16) 65210-37.
improving Village life, educational institutions, model farms, land, financial help and advice, *Sethi* (350-1) (356) (358) 67510-3, 67533-5, 67622-7.
Moral teaching, importance of, *Ghose* (374) (389-94) 67740, 67778-86, 67801-2.

NATURE STUDY:

as a Compulsory subject, recommended, *Roy, S. K.* (469).
as at present Organised, is useless, *Narendra* (407).
Recommended, Sethi (350), *Ghose* (395), *Khan* (442); *not* recommended, *Heycock* (218).

PATNA UNIVERSITY:

Chemical research advocated, *Dobbs* (115).
Correlation with Veterinary College farm advised, *Dobbs* (115).
should be Equipped to assist territorial officers, *Dobbs* (49) (52) 65373-5.
Progress, *Dobbs*, 65580-6.
Rural education faculty advised, *Dobbs* (116).
Pay of graduates, *Ganga Vishnu*, 65334-7.
Population, excessive growth of, would be checked by education, *D. P. Sinha*, 66508-10.

PRIMARY: *See also* ELEMENTARY *above.*

Classes too large, *Fawcus* (318).
vast Extension necessary, *Ross* (339).
Schools, *See also under* AGRICULTURAL *above.*
Attendance in, *Fawcus* (317-4).
Farms and plots at, unnecessary, *Sinha, D. P.* (199).
Project method recommended, *Roy, S. K.* (468).
Propaganda necessary, *Roy, N. K.* (499).
Results of: makes agriculture a discredited profession *Sinha, D. P.* (207).
Rural economy, universities have aroused very little interest in, *Khan* (452).

SABOUR AGRICULTURAL COLLEGE:

was not Affiliated to University, *Dobbs*, 65393-4, 65467-9, 65573, 65670-1.
after, Careers of students: *Foley* (225), *Heycock* (217-8) 66554-7, 66638-42, 66727.
Attendance in second year was not full, *Dobbs* (55).
Closed, *Dobbs* (55) 65392, 65467-9, 65503, 65573-86, 65670-2 (117).
Closed by recommendation of Agricultural Committee, *Sinha, D. P.* (198) 66520-5.
Closing of, a retrograde policy, *Heycock* (217-9) 66552-8, 66564, 66633-4, 66638-42, 66740; regrettable, *Khan*, 68193-5, 68211.

EDUCATION—concld.

SABOUR AGRICULTURAL COLLEGE—*contd.*

Incentive of students: Government employment, *Foley* (225).
Research section still working, *Sinha, D. P.*, 66523.
Short courses at, were not Popular, *Heycock* (217).
Students:
were not of Agricultural classes, *Heycock* (218).
insufficient number attracted to 3 years' course, *Heycock* (217) 66725-7.
Sabour Farm:
Facilities, *Dobbs* (116).
Public school for sons of zamindars advised, *Quinlan* (128).
Subordinate staff, training at, advised, *Dobbs* (116).

SCHOOLS:

Agricultural, *see above.*
Co-operative, *see under* EDUCATION *under* **CO-OPERATION.**
Elementary, not adequately supervised, *Heycock* (224).
Evening, *see under* ADULT *above.*
Primary, *see above.*
should be Village community centres, *Roy, N. K.* (498-9).
School boards, district, recommended, *Roy, S. K.* (469).

SCHOOL FARMS:

District boards should control, *Ganga Vishnu* (37).
should form part of Middle vernacular schools, *Ganga Vishnu* (37).
as at present Organised, are useless, *Narendra* (407).
Practical training necessary, *Ganga Vishnu* (37).
in Primary schools unnecessary, *Sinha, D. P.* (199).
Recommended, *Ganga Vishnu* (37); *Arikshan Sinha* (271); *Sethi* (350); *Ghose* (395); *Khan* (442); *not* recommended; *Heycock* (218).
Useful if properly controlled, *Atkins* (16).
Vocational instruction advocated, *Ganga Vishnu* (37).
School gardens recommended, *Dobbs* (55).

SCHOOL PLOTS

Essential, *Roy, S. K.* (469).
in Primary schools, unnecessary, *Sinha, D. P.* (199).
as at present Organised, are useless, *Narendra* (407).
Recommended, *D. P. Sinha* (199); *Sethi* (350) 67509; *Khan* (442).
Useful if properly controlled, *Atkins* (16).
Secondary schools: agriculture should be an optional subject, *D. P. Sinha* (200).
St. John's Ambulance Association: methods of education recommended as an example, *Sinha, D. P.* (200).

SYSTEM

Criticised, *Narendra* (407) 67873.
does not Increase agricultural efficiency, *Ghose* (394).

TEACHERS: (*See also under* AGRICULTURAL *above.*)

should be drawn from agricultural classes, *Sethi* (350).
Elementary not, very competent, *Heycock* (224) 66597.
Inefficient, *Fawcus* (318); *Roy, N. K.* (499).
Negligence and dishonesty of, *Roy, S. K.* (469).
Pay inadequate, *Roy, N. K.* (499) *Fawcus* (317).
Supply for elementary education inadequate, *Heycock* (224) 66597.
Training to act as local organisers recommended, *Roy, N. K.* (497) (499).
Training schools, intimate touch with village schools recommended, *Roy, S. K.* (468).
should play an important part in Village life, *Roy, S. K.* (468).
Text books: *Quinlan*, 65955.
University, all India, proposed, *Dobbs* (111).

EDUCATION—concld.

UNIVERSITIES :

Affiliation of provincial college necessary, *Sethi*, 67543-4.
Degree course in agricultural science and rural economy recommended, *Khan* (452).
Faculties of agriculture recommended, *Sinha, D. P.* (200) 66525 ; *Roy, S. K.* (457) (468) 68234-5.
too Many, *Ross* (339).
Patna, *see above.*
Rural economy, have aroused very little interest in, *Khan* (452).

VETERINARY COLLEGE AT PATNA :

Affiliation to University, of doubtful benefit, *Quinlan*, 65727-30.
Agricultural Provincial college, should be linked with, if re-opened, *Sethi*, 67549.
Course, 4 years advised, *Quinlan*, 65727-30, 65948-54.
Curriculum, *Quinlan*, 65948-54.
Hygiene, animal :
of Fundamental importance, *Quinlan*, 65725.
Professor of, must have highest qualifications, *Quinlan*, 65725.
to be Opened in 1929, *Quinlan* (118) 65723-4.
Refresher courses recommended, *Quinlan*, 65948-54.
Research, *Quinlan* (118) 65829-30, 65845-51.
Sabour Agricultural College, question of combination with, *Heycock*, 66634-7, 66724.
Staff, *Quinlan*, 65829-30.
Zamindars, etc., should attend short—period courses at provincial farms, *Sinha, D. P.* (200).

EMPLOYMENT, *see that heading and* LEISURE PERIOD *under* **AGRICULTURAL INDUSTRIES** *and see* MIDDLE CLASS YOUTHS *under* **EDUCATION.**

FAWCUS, G. E., M.A., C.I.E., O.B.E., Director of Public Instruction, Bihar and Orissa (316-8) (*See also* **LAMBERT** and **BLAIR**, witnesses).

EDUCATION :

Agricultural : experiment to be made (316).
Attendance in primary schools (317-8).
Banki Union, compulsory education in (317).
Children sent to school too young (318).
Compulsory, difficulty of enforcing (317).
Garjat State, experience of (318).
Primary classes too large (318).
Teachers :
Inefficient (318).
Pay very poor (317).

FERTILISERS :

ADULTERATION ;

Analysis, facilities for, necessary, *Sethi* (355).
Co-operative distribution recommended, *Roy, S. K.* (462) ; *Roy, N. K.* (486).
Guarantee recommended, *Sethi* (355).
Legislation suggested, *Khan* (446).
Penalisation recommended, *Dobbs* (62) ; *Sethi* (355).
Sealed bags recommended, *Ghose* (383) ; *Roy, N. K.* (486).
Advertisement advocated, *Ganga Vishnu* (39).

AMMONIUM PHOSPHATE :

Good for paddy, *Dobbs* (62).
Marketing organisation necessary, *Dobbs*, 65449, 65558-9.
Ammo-phos introduced, *Dobbs*, 65601-2 (*See* Di-ammophos *below*).

AMMONIUM SULPHATE :

Co-operative distribution of, *Ghose* (383).
Ignorance of experiments in other Provinces, *Dobbs*, 65435-6.
Increased use of, *Dobbs* (56) (62-3) 65601.

FERTILISERS—contd.

ARTIFICIAL :

Successful, *Ghose* (383), used for sugarcane and potatoes, *Sethi* (352) 67553-60, 67600-2.
Free limited supply suggested, *Dobbs* (62).
Price difficulty, *Ganga Vishnu* (39) ; *Dobbs* (62) ; *Sethi* (355) ; *Khan* (446).
Rarely used, *Roy, N. K.* (486).
Recommended, *Ghose* (383).
Testing necessary, *Ghose* (383) ; *Roy, N. K.* (486).
not Used in Muzaffarpur area, *Arikshan Sinha* (265).

ASHES, used as, *Henry* (4), *Arikshan Sinha* (265).

BONES :

Export : Causes great loss, *Henry* (4).
should be Stopped, *Sethi* (355).
Prejudice against, *Dobbs* (62) 65434.
Cattle, decrease of, has reduced supply of dung, *Arikshan Sinha* (264-5).

CO-OPERATIVE DISTRIBUTION :

Prasad, 66371-4.
in Ranchi Circle, 4 Central Banks agents for sale of sulphate of ammonia, *Roy, N. K.* (486).
Recommended, *Sinha, D. P.* (204) ; *Arikshan Sinha* (265) (270-1) ; *Sethi* (355) ; *Ghose* (383) ; *Khan* (446) ; *Roy, S. K.* (462) ; *Roy, N. K.* (486).
Subsidies, temporary, recommended, *Roy, N. K.* (486).

COWDUNG :

the Best fertiliser, *Atkins* (19) 65088-92, 65164-6.
Fuel, use of, as :
Coal, substitution of, recommended, *Sinha, D. P.* (204) 66540-3 ; *Roy, S. K.* (463).
High price and Shortage of firewood the causes, *Ganga Vishnu* (39), *Narendra* (409), *Atkins*, 65127-31.
Henry (4).
Impossible to stop, until a fuel substitute can be found, *Ganga Vishnu* (39).
Leaves, use of as fuel, recommended, *Roy, S. K.* (463).
Most farmyard manure is burnt, *Dobbs*, 65556.
Purchase of cowdung, as a means of discouraging its use as fuel, recommended, *Atkins* (19) 65093-6 ; *Khan* (446).
Rahar cultivation recommended, *Sinha, M. S.* (299) 67000-1, 67004-6.
due to Scarcity of alternative fuels, *Arikshan Sinha* (265).
causes Shortage for manure, *Sethi* (355).
Transport, improved, for coal, recommended, *Sinha, D. P.* (204) 66540-3 ; *Ghose* (383) ; *Roy, N. K.* (486-7).
Tree plantation recommended, *Sethi* (355) ; *Ghose* (383) ; *Roy, S. K.* (463) ; *Roy, N. K.* (486-7).
Scarcity of, *Arikshan Sinha* (264-5) ; *Sinha, M. S.*, 66993-9 ; *Ganga Vishnu*, 65292-3 ; *Ghose* (381-3).

DEMONSTRATION :

Farms recommended, *Atkins* (19) ; *Ganga Vishnu* (39).
of Farmyard manure, suggested, *Dobbs* (62).
as to resulting Profits necessary, *Roy, S. K.* (462-3).
Propaganda, *see below*.
Recommended, *Dobbs* (62) ; *Arikshan Sinha* (260) ; *Sethi* (355) (360) ; *Roy, N. K.* (486).
Di-ammo-phos to be tried, *Dobbs*, 65608.

DISTRIBUTION :

Co-operative, *see above*.
on Credit recommended, *Arikshan Sinha* (265).
Free, recommended, *Sethi* (355).
Dowlatpore : considerably increased use of manures in, *Atkins* (19).
Expert advice necessary, *Arikshan Sinha* (265).

FERTILISERS—concld.

Export:
of Bones, causes great loss, *Henry* (4).
of Bones, oilcakes and fish refuse, should be stopped, *Sethi* (355).
of Oilseeds, makes oilcake unavailable, *Ghose* (383).
Financial difficulty, *Henry* (4) 64948-50.
Forest grazing causes enormous loss of manure, *Gibson* (419).

GREEN MANURING:

Dhaincha, recommended for paddy lands, *Sinha, M. S.* (299) 67002-3.
Difficulty, *Dobbs*, 65560.
Sann, for paddy lands recommended, *Sinha, M. S.* (299) 67002-3; *Lal*, 67086-91.
Sethi, 67581-2.

GYPSUM:

great Demand for, in Bihar, *Khan* (446).
Successful, *Dobbs* (63) 65611-2, *Ghose* (383).
Khunti Central Bank, increased use of, in area covered by, *Roy, S. K.* (463).
Leaves, *Dobbs* (87) 65561; *Lyall*, 67928-9; *Roy, S. K.* (463).
Lime deficiency, *Sethi* (359).

Muzaffarpore: increased use of manure, *Ganga Vishnu* (39).
Natural:
Conservation, importance of, *Roy, S. K.* (462).
Shortage owing to insufficient cattle, *Ghose* (381-3).
Nitrate of soda: experiment, *Henry* (4) 64994-6.
Nitrogen:
Deficiency, *Sethi* (354-5).
Nitrogenous fertilisers:
Increased use, *Sethi* (355) 67600-2.
Price, decrease in, *Sethi* (355).

OILCAKES: *See also* OIL-PRESSING *under* **AGRICULTURAL INDUSTRIES.**

too, Expensive, *Henry*, 64997.
owing to Export of oilseeds, not available, *Ghose* (383).
Extensively used, *Dobbs* (62).
for Surgarcane, best, *Ganga Vishnu*, 65291.
Phosphate deficiency, *Sethi* (354-5) (359) 67639-42.

PROPAGANDA:

Co-operative, recommended, *Ghose* (383).
Literature recommended, *Sinha, D. P.* (204).
Markets should be utilised, *Sinha, D. P.* (204).
Popularisation of new fertilisers through schools, post offices, markets and demonstrators recommended, *Sinha, D. P.* (204).
Recommended, *Atkins* (19); *Ghose* (383).

RESEARCH:

Ammonium sulphate, ignorance of experiments in other Provinces, *Dobbs*, 65435-6.
Insufficient, *Sethi* (355); *Roy, S. K.* (463).
Necessary, *Arikshan Sinha* (260); *Khan* (446).
Recommended, *Dobbs* (62-3).
Soils, some require manures and others do not, *Arikshan Sinha* (263).
Soot recommended, *Khan* (446).
Storage facilities necessary, *Dobbs* (62).
Tank mud recommended, *Khan* (446).
Taccavi for purchase of manures recommended, *Sethi* (360).

FINANCE:

BANKS:

Agricultural:
in Place of of co-operative societies, *Sinha, D. P.*, 66494-6.
Recommended, *Sinha, D. P.* (203-4) 66494-6.
vast Extension necessary, *Ross* (339).

FINANCE—contd.

BANKS—*contd.*

Imperial Bank of India should be enabled by Government to advance money on immoveable property, *Meyrick* (429) 68046-53.
Land mortgage banks, recommended, *Meyrick*, 68051-3, *Roy, S. K.* (461) (465); *not* recommended, *Ghose*, 67763, 67803-4.
State, co-operative:
Branch in every village recommended, *Khan* (444).
Recommended, *Khan* (444).
Banking system only finances traders and capitalists, *Roy, S. K.* (460).
Capital, *see under that heading.*
Co-operative, *see that heading.*
Cultivation expenses: Rs. 15 for an acre in a favourable season, *Henry*, 65017-9.
Currency notes recommended, *Roy, S. K.* (460).
Government loans on holdings advocated, *Dobbs* (58) 65411-21, 65478-85, 65525-6.
Importance of, *Sethi* (353), *Roy, S. K.* (459-60).
Improvements should be financed from revenue, *Dobbs* (59) 65422-6.
Irish Land Purchase Acts, example of, *Dobbs* (58) 65481-3.
Planters' capital requirements, *see under* **CAPITAL,** *and see* SUGARCANE *under* **CROPS AND CROP PROTECTION.**
Registration of contracts as to real property suggested, *Dobbs* (58).

TACCAVI:

Administration expenses high, *Tuckey* (281-2).
not of material Benefit, *Sinha, D. P.* (203), *Sethi* (353).
should be Conditional upon village being kept clean, *Phillips* (336).
Co-operative banks preferred, *Khan* (444).
Co-operative movement when extended will render taccavi unnecessary, *Prasad* (161).
Delay deprecated, *Prasad* (161).
Difficulties in obtaining, *Tuckey* (281).
Distribution:
through Co-operative societies, recommended, *Atkins* (18) 65197-8, *Arikshan Sinha* (261), *Tuckey* (282), *Ghose* (378).
by Responsible Government officers only, recommended, *Prasad* (161).
of Doubtful advantage to cultivators, *Tuckey* (281).
for Drainage of land recommended, *Sethi* (354).
for Emergencies only, *Henry* (3).
Extension recommended, *Arikshan Sinha* (261).
Implements, loans for purchase of, suggested, *Narendra* (408).
for Manures recommended, *Sethi* (360).
not Suitable, *Roy, N. K.* (485).
Unpopular, *Sethi* (353).
Used for purposes other than those for which granted, *Tuckey* (281).
fuller Use by cultivators not advocated, *Atkins* (18).
Taxation of incomes secured by law on contracts, advocated, *Dobbs* (59) 65695-700.

FISH, *see* PISCICULTURE *under* **AGRICULTURAL INDUSTRIES.**

FLOODS, *see under* **IRRIGATION** *and* **SOILS.**

FODDER, *see under* **ANIMAL HUSBANDRY.**

FOLEY, B., I.C.S., Board of Revenue, Bihar and Orissa (225-8).
[*See* also Heycock's evidence (217-56).]

AGRICULTURAL INDEBTEDNESS:

Central Provinces Land Revenue Act, largely a failure in Sambalpur (225).
Chota Nagpur Tenancy Act, sections prohibiting sale, transfer or mortgage of holdings, a failure (225).

ANIMAL HUSBANDRY:

Grazing grounds overstocked by uneconomic cattle (227).
Stall feeding, good results of (227).
Uneconomic cattle:
Adverse effect of (227).
Hindu religion prevents destruction of (227).

FOLEY, B—contd.

DEMONSTRATION AND PROPAGANDA :

Inspectors of Agriculture, criticism of (225).

EDUCATION :

Sabour Agricultural College :
Careers of students : not as a rule farming (225).
Incentive of students : Government employment (225).

FORESTS :

Afforestation : expenditure on, vetoed by Legislative Council (227-8).
Destruction :
Considerable soil Erosion caused by (228).
great Extent of (227-8).
Grazing by goats and cattle destroys young shoots (228).
Reservation :
Necessary (227).
Suspicious attitude of cultivators (227).

HOLDINGS :

Fragmentation : difficult to prevent (225).
Partition Act, revision suggested (225).
Sub-division of estates encourages excessive sub-division of holdings (225).

IRRIGATION :

Finance : list of works prevented by financial difficulty (226) (253-4).
Permanent settlement prevents improvement (225-6) (253-4).

LAND TENURE :

Permanent settlement, bad effects of (225-6) (253-4).
Pradhani system in force in Santal Parganas (225).

SOILS : erosion caused by destruction of forests (228).

FORESTS : (*See also under* **LYALL.**)

AFFORESTATION :

Finance :
Difficulty of, *Gibson* (417).
Expenditure on, vetoed by Legislative Council, *Foley* (227-8).
Legislation necessary to encourage, *Arikshan Sinha* (265).
Necessary, *Narendra* (409) (411).
Openings for :
in Bihar, *Khan* (451).
in Chota Nagpur, *Sinha, D. P.* (206).
Gibson (417).
in Villages, no opening for schemes, *Arikshan Sinha* (270).
Systematic, recommended, *Ghose* (389).
Waste lands should be afforested, *Sinha, D. P.* (206).
Wild animals, damage by, will be increased by, *Arikshan Sinha* (270).

AGRICULTURAL PURPOSES :

Classification of forests, *Gibson* (417-8).
Policy of Government as to, *Gibson* (417-9).
Prior claim recognised, *Gibson* (417).
Area dangerously low, *Gibson* (418).
Bamboos, Planting recommended, *Arikshan Sinha* (265).
British India ; area of forest, *Gibson* (418).
Burning, control necessary, *Gibson* (419).
Conservation :
to prevent Floods recommended, *Gibson* (416),
to increase Water supply, *Gibson* (417).
Cultivation on forest lands prohibited, *Narendra* (411).

FORESTS—contd.

DEFORESTATION :

in Chota Nagpur, *Ghose* (388-9), *Roy, S. K.* (463), *Roy, N. K.* (491).
Erosion caused by, *Foley* (228), *Ghose* (389), *Khan* (451).
great Extent of, *Foley* (227-8).
Soil deterioration caused by, *Ghose* (382).

DETERIORATION :

Caused by excessive grazing and unregulated felling, *Gibson* (417), and burning, *Gibson* (419).
Erosion caused by, *Gibson* (416-7), *Khan* (451).
Grazing, *see below.*
Remedies, *Gibson* (416-7).

FIREWOOD :

Agricultural Associations should distribute, *Khan* (450).
Lopping not allowed in reserve forests, *Sinha, D. P.*, 66542.
Shisham trees, *see below.*
Shortage caused by land tenure system, *Arikshan Sinha* (265) (269).
Tree plantation recommended to prevent use of cowdung as fuel, *Sethi* (355), *Ghose* (383), *Roy, S. K.* (463), *Roy, N. K.* (486-7).
Waste lands should be afforested, *Sinha, D. P.* (206).
Floods : opening of passages through railways recommended, *Sinha, D. P.* (206).

FODDER : (*See also under* **ANIMAL HUSBANDRY.**)

Agricultural Associations should distribute, *Khan* (450).
System, *see below.*
Waste land should be cultivated, *Sinha, D. P.* (206).
Grass cutting permitted but not practised, *Khan* (450).

GRAZING : (*See also under* **ANIMAL HUSBANDRY.**)

Deforestation sometimes caused by, *Ghose* (388).
Deterioration caused by, *Gibson* (417-8), *not* caused by, *Sinha, D. P.* (206), *Arikshan Sinha* (270), *Khan* (450).
a Difficult question, *Dobbs*, 65447.
Diminution probable in future, *Gibson* (416-8).

Facilities :
in Chota Nagpur, *Ghose* (388).
as Extensive as possible, *Gibson* (416).
Granted freely, *Khan* (450).
Inadequate, *Arikshan Sinha* (269), *Narendra* (411).
Fees : should be high enough to exclude inferior stock, *Quinlan* (127).
by Goats and cattle destroys young shoots, *Foley* (228).
Grass cutting preferable, *Quinlan* (127).
Landlords, obstruction by, *Arikshan Sinha* (269).
Manure, enormous loss of, caused by, *Gibson* (419).

Restrictions :
Exclusion of uneconomic cattle advised, *Quinlan* (127).
of the severest kind Justified to preserve forests, *Quinlan* (127) 65810-2.
Silage advised, *Quinlan* (127).
Guards : corruption, *Sinha, D. P.* (206).
Management : local control suggested, *Sinha, D. P.* (206).
Protection, importance of, in Chota Nagpur, *Khan* (451).

RESERVATION :

Methods not convenient, *Sinha, D. P.* (206) 66504-5.
Necessary, *Foley* (227).
not Popular, *Sinha, D. P.* (206) 66504-5, 66542.
Rules should be relaxed, *Narendra* (209) (411).
Suspicious attitude of cultivators, *Foley* (227).
Rights should be legally defined, *Ghose* (388-9) 67695, *Roy, S. K.* (463), *Roy, N. K.* (491).
Sal trees in Chota Nagpur, *Ghose* (388).

FORESTS—concld.

RESERVATION—*contd.*

Shisham trees:
Planting recommended, *Arikshan Sinha* (265).
Used as fuel, *Sinha, D. P.*, 66542.

Staff:
Inadequate, *Quinlan* (127).
Training of subordinates at Veterinary College, Patna, *Quinlan*, 65819-23.
System of firewood and fodder supply should be rotational and in charge of village panchayats, *Gibson* (416) (419).
Village plantations recommended, *Sethi* (355), *Ghose* (389).

FRAGMENTATION, *see under* **HOLDINGS.**

FRUIT, *see under* **AGRICULTURAL INDUSTRIES.**

FUEL, *see* FIREWOOD *under* **FORESTS,** COWDUNG *under* **FERTILISERS,** FUEL *under* **CROPS AND CROP PROTECTION.**

GANGA VISHNU, Planter, Muzaffarpore (37-47).

ADMINISTRATION:
Imperial research institute (like Pusa) should co-ordinate Provincial research (37) 65278-9.
Pusa, touch with (38) 65269, 65295-300.

AGRICULTURAL DEPARTMENT: representatives required, one in each thana (37) 65278-9.

AGRICULTURAL INDEBTEDNESS:
Causes of borrowing: higher standard of life, spend thrift ways, ceremonies, litigation (38).
Extent of:
not very General (38) 65314-5.
Small holders largely affected (38).
Insolvency, special measures to deal with, advocated (38).
Land passing out of the hands of cultivators, 65331-3, 65368-70.
Mortgages, redemption of, special measures to deal with, advocated (38).
Repayment prevented by improvidence and crop failure (38).
Restriction or control of credit of cultivators: inexpedient (38 9).
Sources of credit: land, and movable valuable property (38).
Usurious Loans Act:
Application advocated (38).
Ignorance of, among tenants, 65321-5.

AGRICULTURAL INDUSTRIES:
Charka spinning:
being Adopted (40) 65334-43.
Advocated (40).
Profits: about 1 anna for 3 or 4 hours work, 65338-40.
Fruit growing:
Agricultural Department should devote more attention to (40).
an Important agricultural pursuit (40).
Health conditions, improvement of, devotion of spare time to:
Organisation under expert supervision necessary (40).
Progress considerable (40).

AGRICULTURAL LABOUR:
Attracting labour: good wages effective (40).
Migration:
to Bengal during rice harvesting season (40).
Prosperity of emigrants, 65332-3.
to Purnea District (40).

GANGA VIṢHNU—contd.

AGRICULTURAL LABOUR—*contd.*

Shortage :

Caused by : migration to industries, poor return from the soil and disinclination for hard labour (40).
is General (40).

ANIMAL HUSBANDRY :

Breeding, profitable, 65351-6.
Export of cattle to Bengal, etc., from Muzaffarpore (40) 65294, 65351-2.
Fodder :
Dry, shortage of (40) 65280-2, 65354-7.
Crops, 65364.
Implements, improved : better cattle necessary for, 65294.
Inadequacy of livestock (40).
Pastures, common : shortage of, due to pressure on the land (40) 65354-7.
Prices of plough cattle better in Bengal, 65351-3.
Pusa sales, 65301-2.

CO-OPERATION :

Criticism of movement, 65313-20.
Landholders' inertia an obstacle (38).

CROPS AND CROP PROTECTION :

Sugarcane :

Price insufficient, 65272-4.
Pusa canes very much better than indigenous (38) 65275, 65295-300.

DEMONSTRATION AND PROPAGANDA :

Cultivators willing to adopt expert advice (38).
Practical demonstration on cultivators' fields advocated (38) 65275-7, 65295.
Sugar Bureau at Pusa : valuable services (38) 65295-300.
Sugarcane : very successful demonstration, at Pusa, of improved varieties (38) 65275-7, 65295-7.
Wheat : successful demonstrations at Pusa (38).

EDUCATION :

Adult : demonstration farms advocated (38).

Agricultural :
after-careers, of students, often farming (37).
great Demand for (38).
Farms, demonstration, advocated (41).
institutions, insufficient (37).
in Middle schools, advocated (41).
in Primary schools, advocated (41).

Teachers :
should be drawn from Agricultural classes (37).
Supply insufficient (37).
Teaching facilities, inadequate (37).
Theoretical, advocated (41).
Middle class youths, are being compelled to work on the land by economic pressure (37) 65307-13.
Pay of graduates, 65344-7.

School farms :
Advocated (37).
District boards should control (37).
should form part of Middle vernacular schools (37).
Practical training necessary (37).
Vocational instruction advocated (37).

GANGA VISHNU—concld.

FERTILISERS :

Advertisement advocated (39).
Artificial : Price difficulty (39).
Cowdung, use of as fuel :
Impossible to stop until a fuel substitute can be found (39).
Supply insufficient, 65292-3.
Wood, increase in price (39).
Demonstration farms advocated (39).
Muzaffarpore : increased use of manure (39).
Oilcake best for sugarcane, 65291.

HOLDINGS :

Cultivators becoming landless day-labourers, 65331-3, 65368-70.
Fragmentation :
Hindu law of succession a cause (39).
Impossible to prevent (39).
Sub-division : Poverty caused by (38) 65326-33.

IMPLEMENTS :

Cattle improvement necessary, 65294.
Repairs, difficulty of (39-40).
Soil depletion caused by use of improved implements (39) 65348-50.
Tractors : more productive but land requires rest after using, 65349-50.

IRRIGATION :

Baya River :
practically Dried up (39).
Neglect of, will be disastrous (39).
Importance of (39) 65284.
Muzaffarpore : inadequacy of irrigation in (39) 65282-4.
Silting causing rivers to dry up (39) 65283-8, 65290.
Wells : nature of soil in Muzaffarpore necessitates brick walls, 65289.

LAND TENURE :

Cultivators becoming landless day-labourers, 65331-3, 65368-70.
Price of land Increasing, 65326-33.
Rent : Rs. 10 or Rs. 15, 65304-6.

RESEARCH :

Fodder preservation experiments at Pusa, 65365-7.
Imperial Institute should co-ordinate provincial research (37).
Stations :
Inadequate (37).
one in each Province required (37).

WELFARE OF RURAL POPULATION : Poverty caused by smallness of holdings and dispossession of cultivators, 65326-33, 65368-70.

GHOSE, Tara Prasanna, Ranchi (373-407).

ADMINISTRATION :

Transport :
Motor goods services recommended (377).
Railways :
Cowdung, use of as fuel : special transport facilities for coal recommended (383).
Fodder transport facilities necessary (386).
Free travelling facilities for surplus labour recommended (388).
Roads :
Agricultural Department should be consulted as to (377).
Central road board recommended (377) 67690-1.
not Deteriorating, 67829-31.
Irrigation : roads can be utilised as embankments for storing water (377).
More required for marketing (377) 67688-9.

GHOSE, T. P.—contd.

AGRICULTURAL DEPARTMENT: Staff: insufficient (376-7).

AGRICULTURAL INDEBTEDNESS:

Causes of borrowing: Crop failures, cattle disease and litigation (378).
Cause of indebtedness: diseased minds of village people (389-90).
Legislation not recommended (379).
Moneylenders not the cause of (389-90).
Repayment prevented by: crop failures, illness, litigation (379).
Restriction or control of credit of cultivators not recommended (379).
Sources of credit: moneylenders and co-operative societies (379).

AGRICULTURAL INDUSTRIES:

Basket making recommended (387).
Co-operative assistance recommended (391).
Department of Industries should introduce (391).
Employment on construction of roads, bunds, tanks, canals and wells recommended (387).
Fruit growing recommended (387).
Health conditions, devotion of spare time to improvement of:
Sanitary education and co-operative societies recommended (387).
Industrial concerns moving into rural areas, not desirable (387).
Lac culture recommended (387).
Marketing arrangements necessary (387).
Obstacles: lack of training and caste prejudices (387).
Pisciculture recommended (387).
Poultry rearing recommended (387)
Preparation of agricultural produce for consumption, industries connected with:
Government help recommended (387).
Rope making recommended (387).
Sericulture recommended (387).
Study, intensive, necessary (387).
Training by Government experts necessary (387).

AGRICULTURAL LABOUR:

Emigration (387-8) 67699-703.
Labour-saving machinery recommended (374).
Recruitment for tea gardens of Assam, etc., from Chota Nagpur should be prohibited by law (387-8) 67692-4.
Shortage in Chota Nagpur owing to very thin population and emigration (387-8).
Uncultivated land in Chota Nagpur should be developed by surplus labour assisted by grants of land, free railway travelling, housing arrangements and loans (388).

ANIMAL HUSBANDRY:

Cattle breeding: co-operative societies should receive breeding stock free from Government farms (386) (394).
Dairying:
Milk, market for in towns (383) (386).
Model diaries recommended (387).
Fodder:
Crops recommended (381-3) (386-7).
Importation suggested (386-7).
Shortage from February to June (387).
Transport facilities necessary (386).
Pastures: Common:
Overstocked (386).
Ploughing recommended (386).
Enclosed: Absence of (386).
Plough cattle: prices very high (378).
Silage recommended (386).

CAPITAL, ATTRACTING OF, TO AGRICULTURE:

Demonstration, practical, that farming can be made to pay, recommended (395).
Improvements discouraged by: small return on capital invested, rent restriction, and prohibition of transfer of tenancies in Chota Nagpur (395).
Need of capital, 67715-9.

GHOSE, T. P.—contd.

CO-OPERATION :

Agricultural Department, assistance given by, 67727, 67832-3.
Cattle breeding : Teaching recommended (386).
Central Banks : District boards should deposit funds with (393).
Credit societies :
Economic condition of village people not much improved by (389-90) 67696.
Long term credit :
Length 10 years, 67804-11.
Reduction of interest to cultivators to 6¼ by means of loans at 3 per cent from Imperial Bank to Provincial Bank, recommended (377-8).
Multiplication of, not recommended (394).
Short term credit, present system adequate (377).
Department : should Consult organisations as to policy, 67764.
District boards :
should Assist welfare societies (393-4).
take no Interest in co-operation, 67730-1.
Education :
Adult, societies recommended (374).
of Members, moral importance of (389-94), 67740.
Education Department, no assistance from, in Khunti, 67728.
Farming demonstration societies recommended (374).
Federations :
Organisation of, necessary (390) 67752-7.
Subsidies from Government and district boards recommended (393) 67752-7.
should Supervise welfare societies (391).
Financial Adviser to Registrar, appointment of, necessary, 67758-62.
Implements, distribution of, recommended (384-5).
Irrigation recommended (380-1).
Joint farming recommended (379).
Land mortgage banks not recommended, 67763, 67803-4.
Manure stores recommended (384).
Minorities, compulsion of, to come into schemes for joint benefit, recommended (394).
Moneylenders, co-operators borrow from (378).
Non-officials :
entire Dependence on, not desirable (393).
Organisers, *see below.*
Objects : moral and economic (389-94) 67740, 67778-86, 67801-2.
Organisers :
Illiteracy an obstacle, 67791-800.
Training in a Government institution recommended (392-3) 67744-51.
Work of (390-1) (393).
Propaganda, importance of, 67720-5, 67768-72.
Public Health Department, no assistance from, in Khunti, 67729.
Registrar, constant change of, deprecated, 67765-7.
Sale societies, premature (389) 67828.
Seed distribution stores recommended (384).
Subsidiary industries should be organised by (391).
Veterinary work recommended (385).
Welfare societies :
Arbitration of disputes suggested (391), 67699-703.
Bulls should be supplied to, from Government farms, (394).
Concentration on, recommended (394).
Credit facilities afforded, 67787-90, 67816-28.
District boards :
no Assistance given by, 67730-1.
should Assist (393-4).
Liability of members, limited and unlimited, 67787-90.
Multiple societies recommended, 67774-7, 67816-28.
Necessary in every village (389-90) 67768-72.
Schools should be established with the help of (391) 67826.
Staff, 67738-9.
Supervision by Federations, recommended (391-2).

GHOSE, T. P.—contd.

CROPS AND CROP PROTECTION :
Fodder crops recommended (381-3) (386).
Groundnut recommended (375-6) (384).
Market facilities for improved crops necessary (383).
Rice, *dahia* variety, successfully cultivated (384).
Seed distribution :
Arrangements necessary (383).
Co-operative, recommended (384).
Wild animals, damage by : gun licenses, extension of, recommended (384).

CULTIVATION :
Rotation in uplands in Chota Nagpur (384).

DEMONSTRATION AND PROPAGANDA :
Co-operative workers recommended (380-6).
on Cultivators' own fields recommended (375).
Failures, instances of (376).
Groundnut and Sugarcane successfully demonstrated in Khunti sub-division (375).

EDUCATION :
Adult:
Cinema recommended (374).
Co-operative societies recommended (374) (375).
Agricultural:
Agricultural classes, small percentage of, in high schools and colleges, (394).
in Schools recommended (394-5).
Compulsory, in rural areas, not recommended (395) 67697-8, 67740.
Co-operative assistance recommended (374) (385) (391) 67826.
Middle class youths, attracting of, to agriculture :
Demonstration to prove that agriculture can be made profitable, co-operative farming societies with Government help, labour saving machinery (374) 67664-76, 67732-5.
Moral teaching, importance of (374) (389-94) 67749, 67778-86, 67801-2.
Nature study recommended (395).
School farms recommended (395).
System does not increase agricultural efficiency (394).

FERTILISERS :
Adulteration : Sealed bags recommended (383).
Artificial :
Recommended (383).
Testing necessary (383).
Co-operative distribution recommended (383).
Cowdung, use of, as fuel :
Coal, special transport facilities recommended (383).
Tree plantations recommended (383).
Gypsum : successful (383).
Natural : shortage of owing to insufficient cattle (381-3).
Oilcake not available owing to export of oil-seeds (383).
Propaganda :
Co-operative, recommended (383).
Sulphate of Ammonia :
Co-operative distribution of (383).
Successful (383).

FINANCE :
Land mortgage banks not recommended, 67763, 67803-4.
Taccavi : through co-operative societies recommended (378).

FORESTS :
Afforestation, systematic, recommended (389).
Deforestation :
Erosion caused by (389).
Rapid, in Chota Nagpur (388-9).
Soil deterioration caused by (382).

GHOSE, T. P.—contd.

FORESTS—*contd.*

Grazing:
Deforestation sometimes caused by (388).
Facilities in Chota Nagpur (388).
Rights should be legally defined (388-9) 67695.
Sal trees in Chota Nagpur (388).
Village plantations on waste lands recommended (389).

HOLDINGS:

Consolidation, obstacles to: conservatism and laws of inheritance (379).
Fragmentation: causes loss of efficiency (379).
Joint farming co-operative societies recommended (379).

IMPLEMENTS:

Co-operative distribution and sale recommended (384-5).
Demonstration recommended (384).
Manufacture should be assisted by Government rewards and subsidies (384).
Ploughs:
Improved, too heavy for cattle, light ploughs required (384).
Price difficulty (384-5).

IRRIGATION:

Bunds recommended (380-1).
Chota Nagpur, importance of irrigation extension (380-1).
Kanke system, 67736.
Reservoir and tank construction by co-operative effort recommended (380).
Schemes suggested (380-1).
Scope for vast extension (379).
Wells, co-operative construction, recommended (381).

LAND TENURE:

Landlords:
Absentee, 67672-3.
lack of Interest in agriculture, 67663-76.
Propaganda among, recommended, 67669-71.
Rent, 67812-5.

MARKETING:

Crop improvement: marketing facilities necessary (383).
Facilities not satisfactory (389).
Middlemen:
Number excessive (389).
Profits excessive, 67678-9.
Roads required (377) 67688-9.
Subsidiary industries, marketing arrangements necessary (387).
Weighing: Neutral tallymen suggested, 67678-9.

RESEARCH:

Central Government should control and finance (374) 67677.
Extension necessary (373-4).
Provincial as well as central recommended (374) 67677.
Staff:
Increase recommended (374).
Indianisation, efficiency should not be sacrificed to (373-4).

SOILS:

Drainage:
Co-operative drainage has improved soil in Khunti Sub-division (382).
Necessary (381-2).

GHOSE, T. P.—concld.

SOILS—*contd.*

Erosion :
Bunds recommended (382).
Serious in Chota Nagpur (382).
Forest destruction has led to deterioration of soil in Chota Nagpur (382).
Kanke Government farm, great improvement of soil in (382).
Rice *raya* or *sandha* disease due to poverty of soil (378) (382-3).
Survey necessary (381).

VETERINARY :

Co operative assistance recommended (385).
Dispensaries :
Propaganda as to, recommended (385).
Use of, by agriculturists, not full (385).
Inoculation :
Prejudice against, removed by co-operative propaganda (385).
Staff insufficient (385).
Staff : insufficient (376-7).
Training of men of *gowala* caste recommended (385) 67741-3.

WELFARE OF RURAL POPULATION :

Litigation :
Arbitration, co-operative, suggested (391) 67699-703.
Panchayat system disorganised (378-9).
Moral standard of people, very low (389-90) (395).
Population : very sparse in Chota Nagpur (387-8).
Ranchi district : condition of the people most deplorable (396) 67699-703.
Surveys, economic :
Co-operative assistance recommended (395-6).
Recommended (395).
Scope of enquiry (395-6).
Welfare societies, *see under* CO-OPERATION.

GIBSON, A. J., I.F.S., F.C.H., F.L.S., F.Z.S., Conservator of Forests, Bihar and Orissa (416-9).

(*see also* **LYALL,** witness).

ANIMAL HUSBANDRY :

Fodder crops recommended (418).
Plough cattle, improvement of, necessary (418).
Stall-feeding recommended (418).

FORESTS :

Afforestation schemes :
Finance difficulty (417).
Openings for (417).
Agricultural purposes :
Classification of forest (417-8).
Policy of Government as to (417-9).
Prior claim recognised (417).
Area dangerously low (418).
British India ; area of forest (418).
Burning, control necessary (419).
Conservation :
to prevent Floods recommended (416).
to increase Water supply (417).
Deterioration :
Caused by excessive grazing and unregulated felling (417) and burning (419).
Erosion caused by (416-7).
Remedies (416-7).

GIBSON, A. J.—concld.

FORESTS—*contd.*

Grazing :
Deterioration caused by (417-8).
Diminution propable in future (416-8).
Facilities as extensive as possible (416).
in Forests, causes enormous loss of manure (419).
System of firewood and fodder supply should be rotational and in charge of village *panchayats* (416) (419).

GRAZING, *see under* **ANIMAL HUSBANDRY** *and* **FORESTS.**

GUR, *see under* **AGRICULTURAL INDUSTRIES.**

HEALTH, *see under* **WELFARE OF RURAL POPULATION.**

HENRY, J., Lohat Sugar Works, Lohat (1-14).

ADMINISTRATION :

Transport :
Railways : Feeder lines, extension advocated (2) (5).
Roads :
Extension advocated (2) (5).
Metal, very little, 64953-6.
Repairs, fairly good, 64953-6.
Tramways :
Attitude of local authorities to (2) (5).
Extension advocated (3) (5).
Private, Carrying goods for the public by, illegal (2) (5) 64936-41.
Prohibitive terms (2) (5) 64938-40.

AGRICULTURAL DEPARTMENT : Services : Efficient but ineffective for lack of staff (2) 64934-5.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : crop failure, litigation, ceremonies (3) 65015-6, land purchase (3).
Extent of : 75 per cent of cultivators (3).
Moneylenders :
Account methods, complicated (3), 65012.
do not Harass cultivators, unless a quarrel arises (3) 65013.
do not Seize land (3).
Repayment prevented by : crop failure, litigation, ceremonies, and usury (3).
Restriction or control of cultivators, credit : not advocated (3) 65014.
Sources of credit ; land of cultivators only (3).

CO-OPERATION :

Credit societies : Best means of financing and teaching ryots (3) (5-6) 65020-1.
Education, lack of, 65022-3.
Implements, improved : should be popularised by societies (5).
Non-officials : importance of (5).
Organisers, honorary : work of (5) 64963-7.
Primary societies : numbers increasing, 65001-5.
Supervision : necessary (6) 64966-71, 65001, 65022-3.

CROPS AND CROP PROTECTION :

Pests :
Borer causes great damages to sugarcane (4).
Caterpillar causes great damage to rabi crops (4).
Sugar cane :
Bhoorli variety has deteriorated (1).
Coimbatore cane replacing local Bhoorli (1-2) 64930-3.
Cutting : December to April deteriorates after 48 hours, 64972-4, 64987

HENRY, J.—contd.

CROPS AND CROP PROTECTION—*contd.*

SUGARCANE :

Pusa canes, distributed, 64981-2, 64988.
Seed :
Pusa cane setts, advanced without interest by Lohat Sugar Works 64981-2, 64992-3, 64998-9, 65035.
Sugar beet unsuccessful, 64983-4.

CULTIVATION :

Methods of ryots give poor but constant return (4).
Poverty leads to poor results (4) 64951-2.
Rotations : financial obstacle to fallowing (4).

DEMONSTRATION AND PROPAGANDA :

Continuous demonstration, advocated (2).
Cultivators : conservative (2) 64930, 65039-40.
on Cultivators own fields, advocated (2).

FERTILISERS :

Ashes : used on a large scale (4).
Bones : export causes great loss (4).
Cowdung : used as fuel (4).
Financial difficulty (4) 64948-50.
Nitrate of soda : experiment (4) 64994-6.
Oilcakes : too expensive, 64997.

FINANCE :

Cultivation expenses : Rs. 15 for an acre in a favourable season, 65017-9.
Taccavi : for Emergencies only (3).

HOLDINGS : Consolidation of : legislation to deal with minors, widows, etc., not advocated (3).

IMPLEMENTS :

Cattle too poor to pull improved implements (5).
Co-operative popularisation suggested (5).
Improved, almost unknown (5).

IRRIGATION :

Embankments : dangerous (3).
Lift : difficulty, 64947.
Wells : inadequate (3) 64942-6.

LOHAT SUGAR WORKS :

Agency system, 65041-2.
Consumption of cane :
Local only, 64987.
17,000 maunds in a day, 64976.
Fertilisers : has not succeeded in distributing, 64994, 65035.
Jaggery, not purchased by, 64985-6, 65000.
Loans made to ryots on condition that produce is sold to, 65006-10.
Output of sugar : 1 lakh in a good season, light brown, 64977-8.
Price of imported sugar, Works dependent on, 65026-30.
Seed : Pusa cane setts advanced to cultivators without interest, 64981-2, 64992-3, 64998-9, 65035.
Selling of sugar : by brokers, mostly consumed in the Punjab, 64979-80.
Sulphitation process used, 65011.
Supply of cane for, insufficient, 64975.

MARKETING :

Sugarcane :
Competition between mills and local market for *gur*, 64958-60.
Deteriorates after 48 hours, 64973-4, 64987.
Factories, limitation of number advocated, 64961-2, 65031-4.

HENRY, L.—concld.

MARKETING—*contd.*

Sugarcane :
Price, fixed by reference to price of sugar, 64957, 65037-8.
Quality : impossible to pay by sucrose value, 64921-9, 64988-91.
Transport : lack of facilities adversely affecting prices of produce (5).

RESEARCH :

Coimbatore Cane station : importance of work of (1).
Sugar Bureau : importance of work of (1).

SOILS :

Erosion by floods (3-4).
Reclamation : Instance of marked improvement (4).

VETERINARY :

Department : successful (2).
Inoculation : prejudice against, dying out (2).

HEYCOCK, W. B., I.C.S., Commissioner, Patna Division (217-56).

See also Foley's evidence (225-8), (253-6).

ADMINISTRATION :

Development Officer should control Veterinary, Agricultural and Co-operative Departments (222) 66583-7, 66662.
Local Self-Government, 66749-56.
Transport :
Communications, district boards willing to spend money on, 66750, 66755-6, 66799.
Roads :
Bullock carts excluded from part of the road in some areas, 66795-6.
Cess : District boards receive, 66797-8.
Tax :
on Bullock carts should be earmarked for roads, suggestion, 66780-1, 66793-6. Provincial suggested, 66785-92.

AGRICULTURAL DEPARTMENT :

Botanist and Chemist : failure to fill the posts of, a retrograde policy (219).
Co-operation :
Registrar, close touch with, recommended (220).
Relations of departments, 66741.
Development Officer should control Veterinary, Agricultural and Co-operative Departments (222) 66583-7, 66662.
Expansion too slow (219).
Functions, 66693.
Marketing of produce, with assistance of co-operative societies, recommended (219).
Policy in some respects retrograde (219) 66740.
South of Province, work in, 66772-3.
Staff : Inadequate (219).
Training, 66638-42.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : Ceremonies, joint family system, inherited debts (220).
Interest :
High (220).
Legislation to reduce, suggested (220) 66568-73.
Measures for lightening agriculture's burden of debt :
Co-operation, the only practical method (220).
Moneylenders, control indebted cultivators (220) 66712-3, 66733.
Repayment prevented by :
accumulation of high interest, excessive amount of loans (220).
Sources of credit : Moneylenders and Co-operative Societies (220).
Usurious Loans Act : useful as to previous debts of members of co-operative societies (220) 66568-73, 66712-3.

HEYCOCK, W. B.—contd.

AGRICULTURAL LABOUR :

Emigration, 66622-32, 66754.
Kamiauti Agreements Act, ineffective, 66680-5, 66700.
Shortage : none in Patna Division (223).
Wages, uneconomic, 66680-5, 66700.

ANIMAL HUSBANDRY :

Cattle breeding :
in an Experimental stage (220).
Farms :
at Cuttack, proposed (220).
at Patna being established (220).
Fodder :
Crops recommended (223).
Shortage most acute in hot weather (223).
Grazing :
Common grounds :
Adequate provision of, impossible (223).
of no real Help (223).
Uneconomic cattle, breeding of, encouraged by (223).
Waste lands, very little in Patna Division (223).
Implements, improved : cattle unsuitable for heavy ploughs (222).
Landowners : not interested in (223).
Stall feeding recommended (223).
Uneconomic cattle : elimination necessary (223).

CO-OPERATION :

Audit : essential (223) 66565, 66742.
Agricultural Departments should work in close touch with Registrar (220) 66741.
Credit societies : members often go to moneylenders (220).
Danger of over-expansion without adequate inspecting agency (223-4).
Development Officer should control Co-operative, Veterinary and Agricultural Departments (222) 66583-7, 66662.
Embezzlement, danger of (220) (223) 66565.
Implements, distribution of, suggested (222).
Irrigation, difficulty of, 66617.
Liquidation : 66565-7, 66665-8.
Marketing recommended (219-20).
Members : cannot control their societies (223) 66678-9.
Objects : 66676-9.
Panchayats : inclined to look to their own advantage (223).
Progress : Deterioration in recent years (220) 66565.
Public Demands Recovery Act, 66665-8.
Sale societies :
Extension urgently needed (224).
Potato society in Bihar a great success (223) 66591-3.
Seed distribution recommended (222).
Supervision, importance of, emphasised (220) (223-4) 66565, 66742.

CROPS AND CROP PROTECTION :

Fodder crops recommended (223).
Improvement : by experimental farms (222).
Seed distribution :
through Co-operative societies recommended (222).
Farms recommended, 66715-7.
Wild animals, damage by : jungle clearing recommended (222).

DEMONSTRATION AND PROPAGANDA :

Court of Wards, model farm at Bettiah, 66703.
Cultivators :
Suspicious of innovations (219).
Willing to accept advice (219)
on Cultivators own field recommended (219) 66647, 66711.

HEYCOCK, W. B.—contd.

DEMONSTRATION AND PROPAGANDA—*contd.*

Danger of demonstration before improvement is proved to be successful (219).
Decorations (honours), giving of, to cultivators, suggested, 66563, 66718-20.
Failures: does not know of any (219) 66714.
Farms, departmental, recommended (218-9) (222) 66643-6, 66715-7, 66723, 66774-6.
Groundnut: successfully demonstrated in Chota Nagpur (219).
Improvements, 66714, 66721-2.
Local demonstration recommended (218-9).
Produce rent system discourages cultivators from adopting improvements, 66691-7. (*See under* LAND TENURE).
Rice: Dahia variety successfully demonstrated (219).
Sipaya Farm, 66774-5.
Sugarcane, Coimbatore, successfully demonstrated (219).

EDUCATION:

Adult:
an Indirect method of teaching children (218).
Practical training by short courses on farms recommended (218).
Agricultural:
Incentive: hope of finding employment (217).
Revenue officers, training in technical agriculture suggested. 66556-7, 66638-42.
Zamindars' sons not attracted owing to land tenure system (217-8) 66559-62, 66701-7.
Agricultural College, provincial, question of re-opening of:
Affiliation to University, 66725-6.
Entrance qualification, 66728-30.
Veterinary College, question of combination with, 66634-7, 66724
Compulsory:
Act, permissive, in force, 66595.
Banki Union have adopted, 66596-7.
Financial difficulty, 66595-9.
not Recommended, 66594-9.
Court of Wards encourages training of minors, 66701-7.
District boards in favour of building schools, to the detriment of other activities, 66749, 66755-6.
Elementary:
Course, not long enough (224).
Finance: funds inadequate (224).
Illiteracy, relapse into (224).
Management, committees difficult to find (224).
Quality, poor (224).
Schools not adequately supervised (224).
Teachers:
not very Competent (224) 66597.
Supply inadequate (224) 66597.
not sufficiently Widespread (224).
Middle class youths, attraction of, to agriculture:
Landlords should cultivate their land (218).
Obstacle: lack of employment (218).
Nature study: in rural tracts not recommended (218).
Sabour Agricultural College:
Closing of, a retrograde policy (217-9), 66552-8, 66564, 66633-4, 66638-42, 66740.
Employment of students: only Agricultural Department (217-8) 66554-7, 66638-42, 66727.
Short courses:
Agricultural class students (218).
were not Popular (217).
Students taking 3 years course:
not of Agricultural classes (218).
insufficient Number attracted (217) 66725-7.

HOLDINGS:

Fragmentation:
Difficulty of prevention, 66743-5.
Efficiency lost by (220).
Subdivision of proprietary interests, excessive (221) 66648-9, 66733.

HEYCOCK, W. B.—contd.

IMPLEMENTS :

Cattle :
Improvement suggested (222).
Unsuitability of, for drawing heavy ploughs (222).
Co-operative distribution recommended (222)
Cost, difficulty of (222).

IRRIGATION :

Improvement, scope for, practically unlimited (256).
Khora Valley project (255).
Minor Works Irrigation Act, 66709.
Orissa canals (255-6).
Owners rates (254-6).
Private systems :
Control system, 66600-7, 66609.
Co-operative schemes, difficulty of, 66617.
District irrigation boards not recommended, 66747-8.
Extensive (221).
Government control would be beneficial, 66605, 66607-15, 66746.
Land Tenure system causes neglect (*See* LAND TENURE).
often Neglected (221) 66601-4, 66616, 66650-61, 66708-10.
Ownership divided among many landlords (221) 66600, 66603-4.
Supply of water, 66618-21.
Private Works Irrigation Act, 66709.
Sone Canals (255).
United Provinces Bill of 1925, premature in Bihar and Orissa (256).

LAND TENURE :

Batai system, 66671.
Bengal Tenancy Act, 66737, 66745.
Cash rents, 66650-61, 66778-9, 66782-4.
Intermediaries between landlord and tenant, 66735-6.
Landlords :
do not Cultivate (217-8).
Illegal demands made by, 66686-90.
not Interested in agriculture (218) (223) 66559-63, 66663-4, 66701-7.
are primarily Rent collectors (217-8) 66708.
Sub-division, excessive, of proprietary interests (221).
Permanent settlement, effects of (217-8) (223), 66607-15, 66617, 66663-4, 66669-75, 66734, 66746-8, 66757-71, 66777.
Produce rents :
Area, very large (221).
Commutation wanted by tenants but opposed by landlords (221) 66580-2, 66650-61, 66778-9, 66782-4.
Disadvantages of system (221) 66574-82, 66650-61, 66669-75, 66691-9, 66782-4.
Half the gross produce (221) 66574-82.
Irrigation adversely affected by (221) 66606, 66650-61, 66698-9, 66746-8 (255).
Tenancy Bill, 66760.
Transfer of tenancies not free, 66686-90, 66731-2.

MARKETING :

Agricultural Department should assist cultivators (219).
Co-operative, recommended (219-20) (223) (*See* SALE SOCIETIES *under* CO-OPERATION).
Improvement : considerable, necessary (223).

VETERINARY :

College at Patna : question of combining with provincial agricultural college, if latter re-opened, 66633-7.
Contagious diseases :
Legislation, compulsory, time not ripe for (222).
Obstacles to dealing with, ignorance and prejudice (222).
Department : expansion too slow (220) 66738-9.
Development Officer should control Veterinary, Agricultural and Co-operative Departments (222) 66583-7, 66662.

HEYCOCK, W. B.—concld.

VETERINARY—*contd.*

Dispensaries:
Control:
is by District boards and municipalities (222) 66750-1.
Provincial compared with local (222).
System working fairly well (222).
Expansion not sufficiently rapid (222).
Finance: lack of funds (222) 66750-1.
Inoculation:
Local control removes prejudice (222).
Prejudice against, being gradually overcome (222) 66588.
Rinderpest, co-operation by Feudatory States suggested, 66588-90.
Staff: limited (220).

WELFARE OF RURAL POPULATION:

Hospitals: district boards in favour of, to the detriment of other activities, 66749, 66755-6.
Population, too dense (223).

HOLDINGS:

Common farming system recommended, *Khan* (445).

CONSOLIDATION: (*See also* FRAGMENTATION *below*).

Advances might be made to purchasers of fragments, *Dobbs* (60).
Co-operation, *see under that heading.*
Government estates, consolidation in, should be attempted first, *Tuckey* (284) 66909-13.
quite Impossible, *Atkins* (18).
Legislation suggested, *Dobbs* (60).
Legislation to enforce consolidation premature, *Tuckey* (284) 66909.
Legislation to facilitate exchange of small holdings recommended, *Khan* (445).
Obstacles:
Class differences, *Prasad* (163) 66356-9.
Conservatism, *Prasad* (163) 66356-9, *Ghose* (379).
Ignorance, *Sethi* (354).
Inheritance laws, *Dobbs* (60), *Tuckey* (284), *Ghose* (379).
Interest, lack of, *Tuckey* (284).
Landlords, *Prasad* (163) 66356-9.
Legal difficulties, *Prasad* (163) 66356-9.
Mutual distrust, *Tuckey* (284).
Narrow outlook of cultivators, *Dobbs* (60).
Restriction on alienation, *Tuckey* (284).
Traffic in part holdings, *Tuckey* (284).
Cultivators becoming landless day-labourers, *Ganga Vishnu*, 65331-3, 65368-70.
Estates Partition Act, *Lal* (303) 67032.

FRAGMENTATION: (*See also* CONSOLIDATION *above*).

Bad results of, *Arikshan Sinha* (261-2) (271).
Cottage industries to relieve pressure on land recommended, *Sethi* (353).
Difficult to prevent, *Foley* (225), *Heycock*, 66743-5.
Education as to fragmentation necessary, *Tuckey* (284), *Sethi* (353-4).
Efficiency lost by, *Heycock* (220), *Lal* (302-3), *Ghose* (379).
Hindu law of succession a cause, *Ganga Vishnu* (39).
Impossible to prevent, *Ganga Vishnu* (39).
Increasing, *Tuckey* (283).
Inevitable, *Sinha, D. P.* (204) 66497-501, 66535-6.
Legislation:
Necessary, *Arikshan Sinha* (262).
Recommended, *Lal* (303) 67032; *not* recommended, *Sethi* (354).
very Marked, *Tuckey* (283).
Poverty caused by, *Ganga Vishnu* (38) 65326-33.
Sub-division of estates encourages excessive sub-division of holdings, *Foley* (225).
Sub-division of proprietary interests, excessive, *Heycock* (221) 66648-9, 66733.
Tenancy Acts should be amended to prevent fragmentation, *Narendra* (409).

HOLDINGS—contd.

Inheritance laws, legislation necessary, *Khan* (445).
Joint farming : *see under* **CO-OPERATION.**
Large scale farming recommended, *Khan* (445).
Legislation :
as to Landlords recommended, *Prasad* (163) 66356-9.
to deal with Minors, widows with life interests, persons legally incapable, alienation and dissentients and to keep disputes out of the courts, not recommended—*Henry* (3), recommended, *Arikshan Sinha* (262), not called for, *Prasad* (163), not necessary, *Khan* (445).
Partition Act, revision suggested, *Foley* (225).
Statistics, *Tuckey* (283-4) (287-8) 66940-7.

HOSPITALS, *see under* **WELFARE OF RURAL POPULATION.**

HYGIENE, *see under* **WELFARE OF RURAL POPULATION.**

IMPLEMENTS :

Blacksmiths' shops necessary, *Atkins* (20).
Capital, lack of, prevents use of expensive modern implements, *Khan* (440-1).
Carpenters' shops necessary, *Atkins* (20).
Cattle unfit to pull improved implements, *Henry* (5), *Ganga Vishnu*, 65294, *Heycock* (222), *Narendra*, 67881-5.
Cliff, Deputy Director in N. W. Bihar, work of, *Dobbs*, 65438.
Co-operative : *see* IMPLEMENTS *under* **CO-OPERATION.**
Cost, difficulty of, *Heycock* (222).
Cultivators' conservative habits, *Lal*, 67036-9.

DEMONSTRATION :

Recommended, *Ghose* (384).
on Village farms recommended, *Sethi* (357).
Engineering Section of Agricultural Department, should take up improvement of, *Sethi* (357) 67644.
Hire-purchase system recommended, *Atkins* (20), *Sinha, D. P.* (205).
Hiring of costly implements from co-operative societies, recommended, *Sinha, D. P.* (205).
Hoe, Indian : the only implement for sale in bazaar, *Atkins* (20).
Importation, on account of cost, not recommended, *Narendra* (410).
Improvement, unknown, *Henry* (5).
Instalment system recommended, *Sethi* (357).
Labour-saving machinery, *Sinha, D. P.* (199), *Ghose* (374), 67664-76, 67732-5.
Loans, co-operative recommended, *Khan* (447).

MANUFACTURE :

Government rewards and subsidies recommended, *Ghose* (384).
Local, difficult owing to high cost of materials, and village smiths and carpenters being driven to the towns, *Narendra* (410) 67841-4.
Mass production :
Difficulties of, *Dobbs*, 65439-41.
by Private enterprise recommended, *Sethi*, 67644-7.

PLOUGHS :

Country ploughs generally used, *Arikshan Sinha* (266), *Sethi* (357).
Improved, too heavy for cattle, *Ghose* (384).
Improvement of, *Dobbs*, 65438, importance of, *Sethi* (357).
Iron, recommended, *Khan* (447).
Iron mould-board :
Advised, *Atkins* (19).
being Adopted, *Atkins*, 65167-9.
Light, deep tilling, required, *Ghose* (384).
Meston, not found satisfactory, *Arikshan Sinha* (266).
Punjab iron plough used, *Sethi*, 67645.
Sabul recommended, *Khan* (447).

IMPLEMENTS—contd.

Poverty prevents use of implements and machinery, *Narendra* (410).
Price difficulty, *Sinha, D. P.* (204), *Sethi* (357) 67644-7, *Ghose* (384-5).
Repairs, difficulty of, *Ganga Vishnu* (39-40), *Narendra*, 67881-5.
Research necessary, *Sinha, D. P.* (199).
no Selling agency exists, *Atkins* (20).
Soil depletion caused by use of improved implements, *Ganga Vishnu* (39) 65348-50.
Spare parts, selling agencies necessary, *Atkins* (20).
Taccavi loans recommended, *Narendra* (408).

TRACTORS :

Bullocks not supplanted by, *Atkins*, 65246-8.
more Productive but land requires rest after using, *Ganga Vishnu*, 65349-50.

INDUSTRIAL CONCERNS, moving into rural areas, *see under* **AGRICULTURAL INDUSTRIES.**

INDUSTRIES DEPARTMENT, *see under* **AGRICULTURAL INDUSTRIES.**

INOCULATION, *see under* **VETERINARY.**

IRRIGATION :

Agricultural Department, special irrigation section recommended, *Roy, S. K.* (462).
Baya River :
practically Dried up, *Ganga Vishnu* (39).
Neglect of, will be disastrous, *Ganga Vishnu* (39).

BUNDS :

in Chota Nagpur :
Recommended, *Roy, S. K.* (462) 68243-8, 68289-90, *Roy, N. K.* (485-6).
Successful, examples of, *Roy, S. K.* (462) 68243-8.
Recommended, *Ghose* (380-1).
Saligrami bund from Bettiah to Hajipur should be cut, *Arikshan Sinha* (264) 66834-9.
Canals in Orrissa not recommended, *Narendra* (409).
Chota Nagpur, importance of irrigation extension, *Ghose* (380-1).
Control of, by zamindars leads to oppression of the poor, *Sinha, D. P.* (204) 66537-40.
CO-OPERATIVE : *see* IRRIGATION *under* **CO-OPERATION.**
Distribution :
in Bihar satisfactory, *Sarup* (310).
in Orissa, very wasteful, *Bery*, 67105-8, *Sarup* (310).
District boards might keep boring plants, *Sinha, M. S.* 66984-5.
Drainage, *see under* **SOILS.**
Embankments : dangerous, *Henry* (3).
Extension :
Importance of, *Sethi* (354).
Little scope for, *Bery*, 67093-5, 67165-71, 67181-4.
Vast scope for, *Roy, N. K.* (485).
Extent of, *Tuckey* (284-5) (289) 66931-6, 66950.
Finance : list of works prevented by financial difficulty, *Foley* (226) (253-4).
FLOODS : *See under* **SOILS.**
Government assistance suggested, *Sinha, M. S.* 66984-5, 66989-90.
Importance of, *Ganga Vishnu* (39) 65284.
Improvement, scope for, practically unlimited, *Heycock* (256).
Kanke : *bunds* advocated, *Dobbs* (60-2). System, *Ghose*, 67736.
Khora Valley project, *Heycock* (255).
Landlords, obstruction by, *Arikshan Sinha* (262-3).
Land tenure as affecting irrigation, *Tuckey* (279) 66868-70, 66889.
Laws : Minor and Private Irrigation Works Acts of 1922, no work carried out *under*, *Sinha D. P.* (204).
Legislation :
Necessary to bring irrigation *under* public control, *Sinha D. P.* (204).
Recommended, *Arikshan Sinha* (262-3).

IRRIGATION—contd.

LIFT :

Difficult, *Henry*, 64947.
Iron rahat wheel, etc., recommended, *Sethi* (354) (357), *Khan* (445).
Persian wheel recommended, *Khan* (445).

MINOR WORKS :

Bihar, *Bery*, 67172-3.
small Canals, *Dobbs* (60).
Contour embankments, *Dobbs* (60).
Irrigation Department responsible only for schemes referred to it, by civil authorities, *Bery*, 67099.
Irrigation Act, *Heycock*, 66709.
Openings for, *Tuckey*, 66881-8.
Obstacles :
Apathy of landlords, *Dobbs* (60) 65432-3, 65522-4.
Fixed cash rents, *Dobbs*, 65522-4.
Inheritance laws, *Dobbs*, 65522.
Smallness of holdings, *Dobbs* (60).
Overseers should be appointed, *Dobbs*, 65427-31.
Propaganda, *Bery*, 67099-104.
Muzaffarpore : Inadequacy of irrigation, *Ganga Vishnu* (39) 65282-4.
Obstacles : finance and lack of definite policy, *Roy, N. K.* (486). (*See also under* MINOR WORKS *above.*)
Orissa, a loss being incurred, *Bery*, 67157-8.
Orissa canals, *Heycock* (255-6).
Owners rates, *Heycock* (254-6).
Permanent settlement :
as Affecting irrigation, *Tuckey*, 66868-70, 66965-9, *Bery*, 67185-91.
Prevents improvement, *Foley* (225-6) (253-4).
Persian wheels suggested, *Sarup* (310), *Khan* (445).
Private, *Tuckey*, 66931-6, *Bery*, 67176-7.

PRIVATE SYSTEMS :

Control system, *Heycock*, 66600-7, 66609.
Co-operative schemes, difficulty of, *Heycock*, 66617.
District irrigation boards not recommended, *Heycock*, 66747-8.
Extensive, *Heycock* (221).
Government control would be beneficial, *Heycock*, 66605, 66607-15, 66746.
Land tenure system causes neglect (*See* LAND TENURE).
often Neglected, *Heycock* (221) 66601-4, 66616, 66650-61, 66708-10.
Ownership divided among many landlords, *Heycock* (221) 66600, 66603-4.
Supply of water, *Heycock*, 66618-21.
very Valuable, *Heycock* (221).
Private Works Irrigation Act, *Heycock*, 66709.
Pumping stations with pipe lines from rivers in North Bihar suggested, *Atkins* (18).

Rainfall :

Average 60 ins., but not well distributed, *Sethi* (354).
Bery, 67165-70.
Rates, *Bery*, 67157-64, 67178.
Research as to easy methods necessary, *Sinha, D. P.* (199).

RESERVOIRS :

Investigation necessary, *Khan* (445) (451).
Recommended, *Lal* (303), *Ghose* (380), *Roy, N. K.* (485).
River training recommended, *Lal* (303).
Rivers, drying up, *Lal* (303) 67033-5, 67044-6. (*See* FLOODS *under* **SOILS.**)
Ryots should be encouraged to make their own irrigation works, *Tuckey* (285).
Saligrami bund from Bettiah to Hajipur, should be cut, *Arikshan Sinha* (264) 66834-9.

SCHEMES :

in Chota Nagpur suggested, *Roy, N. K.* (485).
Scope for small, *Sarup* (309-10).
Suggested, *Lal* (303), *Sinha, M. S.* (298) 66981-5, *Ghose* (380-1).

IRRIGATION—contd.

Scope for, great, *Atkins*, 65185, *Ghose* (379).
Silt, *see under* **SOILS.**
Silting causing rivers to dry up, *Ganga Vishnu* (39) 65283-8, 65290.
Son Canals, *Heycock* (255), *Bery*, 67185-91.
Son canals area waterlogged, *Dobbs*, 65626-30.
Survey, *Bery*, 67179-80.

TANKS :

in Bihar, *Sarup* (310).
not Feasible in North Bihar, *Atkins* (18) 65185-6.
in Orissa silted up and brought under cultivation, *Sethi* (354).
Recommended, *Ghose* (380).
Tribeni canal, no scope for extension, *Bery*, 67192-4.
United Provinces Bill of 1925, premature in Bihar and Orissa, *Heycock* (256).
Wastage, *Sarup* (310).
Water requirements of crops should be investigated, *Khan* (445).

WELLS :

Agricultural Department responsible for sinking, *Bery*, 67096-8.
Co-operative construction, recommended, *Ghose* (381).
Inadequate, *Henry* (3) 64942-6.
in Muzaffarpore, nature of soil necessitates brick walls, *Ganga Vishnu*, 65289.
Scope for, unlimited, *Roy, N. K.* (486).
Tube, research necessary, *Roy, N. K.* (486).

JOINT-FARMING, *see under* **CO-OPERATION.**

KHAN, Maulvi Saiyid Muhammad Ahsan, Zamindar and Secretary of the Barh Agricultural Association, Barh, District Patna (440-56).

ADMINISTRATION :

Chamber of Agriculture, all-India, central, recommended (441).
Pusa Agricultural Research Institute :
Cattle breeding, successful work (449).
Control of provincial departments by, recommended (443-4) 68210.
Experts from, should take the place of provincial experts (443).
Staff should be increased (444).
Transport :
Railways, freights for agricultural requisites should be reduced (444).
Roads, rural, for cart traffic necessary (444).
Steamers, freights for agricultural requisites should be reduced (444) (451).

AGRICULTURAL DEPARTMENT :

Agricultural associations, control by Department recommended (443).
Experiments by, have led to great improvement (443).
Finance inadequate (444).
Services inadequate (444).
Staff :
Inadequate (440).
Sympathy with cultivators necessary (440).
Teachers should be supplied by (443).

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : crop failure and other calamities, extravagance (444).
Mortgages :
Non-terminable should be prohibited (444).
Right of cultivator as to, should be limited (444).
Repayment prevented by : Extravagance and high interests (444).
Restriction of cultivators' credit by limiting right of mortgage and sale, recommended (444).
Sources of credit : moneylenders and prosperous cultivators (444).
Usurious Loans Act recommended (444).

KHAN, A.—contd.

AGRICULTURAL INDUSTRIES :

Co-operation suggested (449).
Cottage industries, organisation of, by Industries Department, recommended (450).
Fruit growing : research necessary (441).
Health conditions, devotion of spare time to improving : village societies and propaganda recommended (450).
Implements, agricultural co-operative manufacture of, recommended (450).
Industrial concerns, moving into rural areas recommended (450).
Poultry rearing, religious prejudice (450).
Preparation of agricultural produce for consumption, industries connected with : Government assistance recommended (450) 68228-31.
Study, intensive, recommended (450).

AGRICULTURAL LABOUR :

Kamai system :
should be Revised (450).
is not Serfdom, 68198-202.
Labour colonies, recommended (450).
Shortage :
Migration causes (450).
Subsidiary industries would not aggravate, 68228-31.
Uncultivated land, development of : Grants of land, good wages and labour colonies recommended (450).
Wages, should be systematised (450).

ANIMAL HUSBANDRY :

Cattle breeding :
Co-operative societies recommended (452) 68219-21.
Cross-breeding with cattle from Punjab recommended (449).
Dual purpose aim recommended (449).
Pusa, successful work (449).
Staff, Government, should be increased (449).
Cattle insurance co-operative societies recommended (452).
Dairying :
Milk supply : co-operative societies recommended (449).
Schools recommended (449).
Fodder :
Crops recommended (449).
Shortage from July to December (449).
Varieties used (449).
Landowners : propaganda to lead to greater interest, recommended (449).
Pasture, enclosed, absence of (449).
Silo :
Recommended (446) (449).
not Used by cultivators, 68196-7.

CAPITAL, ATTRACTING OF, TO AGRICULTURE :

Agricultural association, all-India, recommended (453).
Decorations (honours) for capitalist, agriculturists, recommended (453).
Improvements discouraged by lack of confidence in securing adequate return from capital invested (453).

CO-OPERATION :

Agricultural Association at Barh, 68212-21.
Agricultural organisation societies :
Control by Agricultural Department, recommended (443).
Recommended (440) (450-1) (453) 68192, 68203-9.
Subsidies from Government recommended (440) (443).
Cattle breeding societies recommended (452).
Cattle insurance societies recommended (452).
Consolidation of holdings societies recommended (452).
Credit societies :
Deposits, landlords and bankers should be persuaded to make (452).
Loans from Government, free of interest, recommended (451).

KHAN, A.—contd.

Co-operation—*contd.*

Demonstration and propaganda work recommended (440).
Improvements societies recommended (452).
Implements :
Distribution of, recommended (447-8) (452).
Loans for purchase of, recommended (447-8).
Interest, reduction recommended (441) (452).
Joint farming societies recommended (452).
Milk supply societies recommended (449).
Minorities, compulsion of, to join in schemes for the common benefit, recommended (452).
Objects achieved to a great extent (452).
Purchase societies should be increased (452).
Sale societies :
Mismanagement in the past (452).
Recommended (451).
Seed distribution recommended (441) 68217-8.
State Co-operative Bank : recommended, branch in every village desirable (444).
Subsidies from Government recommended (451).
Supervision inadequate (452).

Crops and Crop Protection :

Pests : inadequate attention has been given to (447).
Seed distribution co-operative recommended (441) (446) 68217-8.
Wild animals, damage by :
Fencing recommended (447).
Gun licenses necessary (447).
Serious (447).

Demonstration and Propaganda :

Agricultural associations should be utilised (440) (443).
Cinema recommended (444).
Co-operative assistance recommended (440).
Cultivators, sympathy with, necessary (440) (443).
Decorations (honours) for Capitalist agriculturists, recommended (453).
Farm at Patna failed (443).
Field demonstrations recommended (443).
Indigenous methods recommended (440-1).
Landlords should help (443).
Simplicity, importance of (443).
Vernacular, recommended (443).

Education :

Adult : Evening schools, peripatetic lectures and propaganda recommended (442).
Agricultural :
After-careers of students, very few openings, mainly Government service (442).
Attendance disappointing (442) (453).
College necessary (442) 68193-5.
Institutions inadequate (441-2).
in Middle schools, teaching of scientific agriculture recommended (452).
Practical farm training recommended (442).
in Primary schools, as a compulsory subject, recommended (452).
Pupils, very small proportion belongs to agricultural classes (442).
Sabour College, closing of, regrettable, 68193-5, 68211.
Schools recommended (442).
Short courses for sons of landlords recommended (442).
Stipends, etc., for boys of agricultural classes recommended (442).
Teachers :
should be drawn from agricultural classes (442).
Agricultural Department should supply (443).
Itinerant, recommended (452-3).
Supply insufficient (442).

KHAN, A.—contd.

EDUCATION—*contd.*

Attendance, small proportion of boys in fourth class, due to their having to work (453).
Compulsory, recommended (453).
Finance from Government recommended (443).
Middle class youths, attracting to agriculture :
Preference for Government appointments should be given to applicants trained in agriculture (442).
Nature study recommended (442).
School farms and school plots recommended (442).

Universities :
Degree course in agricultural science and rural economy recommended (452).
Rural economy, have aroused very little interest in (452).

FERTILISERS :

Adulteration : legislation suggested (446).
Artificial : cost difficulty (446).
Co-operative supply recommended (446).
Cowdung, use of, as fuel : purchase by agricultural associations recommended (446).
Gypsum, great demand for, in Bihar (446).
Research necessary (446).
Soot recommended (446).
Tank mud recommended (446).

FINANCE :

Co-operative State Bank recommended, branch in every village desirable (444).
Taccavi : Co-operative banks preferred (444).

FORESTS :

Afforestation, openings for, in Bihar (451).
Deterioration has caused erosion in Chota Nagpur (451).
Firewood : Agricultural associations should distribute (450).
Fodder : Agricultural associations should distribute (450).
Grass cutting permitted but not practised (450).
Grazing :
Deterioration not caused by (450).
Facilities granted freely (450).
Protection, importance of, in Chota Nagpur (451).

HOLDINGS :

Common farming system recommended (445).
Consolidation : legislation to facilitate exchange of small holdings recommended (445).
Inheritance laws, legislation necessary (445).
Large scale farming recommended (445).
Legislation to deal with minors, widows, etc., not necessary (445).

IMPLEMENTS :

Capital, lack of, prevents use of expensive modern implements (440-1).
Co-operative distribution recommended (447-8).
Loans, co-operative recommended (447).
Ploughs, iron, recommended (447).

IRRIGATION :

Drainage of low-lying lands of Bihar, system should be devised (445).
Lift : Rahat pump or Persian wheel recommended (445).
Reservoirs, investigation necessary (445) (451).
Water requirements of crops should be investigated (445).

KHAN, A.—contd.

LAND TENURE :

Produce rents : Commutation has improved the position of cultivators (453).

MARKETING :

Agricultural associations should form a trading federation (451).
Co-operation recommended (451).
Facilities not satisfactory or adequate (451).
Grading recommended (451).
Information, placing of, at disposal of cultivators, etc., recommended (451).
Middlemen :
Commissions excessive (451).
Dupe cultivators (451).

RESEARCH :

Fruit growing, research as to, recommended (441).
Indigenous methods should be improved (440-1).
Organisation, improvement of, necessary (440).
Staff inadequate (440).

SOILS :

Alkali lands, reclamation by gypsum, under-draining and flooding (445).
Drainage, importance of (445).
Erosion : bunds recommended (446).
Flooding :
Deterioration of land by (446).
Improvement of land by (446).
Reclamation :
Demonstration by Agricultural Department recommended (446).
Subsidies recommended (446).

STATISTICS :

Village societies should be utilised to collect (453-4).

TARIFFS AND SEA FREIGHTS :

Export duties on agricultural produce should be reduced (451).
Import duties on agricultural implements should be reduced (451).
Sea freights on agricultural implements and produce should be reduced (444) (451).

VETERINARY :

Contagious diseases : legislation necessary (448).
Department :
Director of Agriculture should control (448).
Finance inadequate (448).
Services inadequate (444).
Staff inadequate (448).
Dispensaries :
Control (448).
by District boards, not satisfactory (448).
Provincial authorities, transfer to, recommended (448).
Expansion inadequate (448).
one in each Sub-division recommended (441).
Touring staff, insufficient (448).
Use of, by agriculturists, not full (448).
Inoculation :
Fees, none charged (448).
Religious prejudice slowly dying out (448).
Research :
Inadequate (448).
Laboratory in each district recommended (441).
Provincial institutions recommended (448).

KHAN, A.—concld.

VETERINARY—*contd.*

Serum : supply insufficient (448).
Staff : Veterinary Assistants should be deputed to each village (441) (444).
Superi or Veterinary Officer with the Government of India, appointment recommended (448).

WELFARE OF RURAL POPULATION :

Conditions as to poverty and ignorance appalling (440) (453).
Grain, increased price of, has benefited cultivators (453).
Health societies, village, recommended (452).
Surveys, economic, recommended (453).

KISAN SABHA, *Arikshan Sinha*, 66846-54, 66859-62.

LABOUR, *see* **AGRICULTURAL LABOUR.**

LAC, *see* **AGRICULTURAL INDUSTRIES** *and* **NORRIS.**

LAL, GURUSAHAI, M.L.C., Vakil, Bihar and Orissa (302-9).

AGRICULTURAL INDEBTEDNESS :

Bengal Tenancy Act, 67041-3.
Causes of borrowing : crop failures, ceremonies, cattle mortality and litigation (302) 67047-9.
Damdopat, should be adopted (302) 67051.
Interest :
Rates 18 to 24 per cent per annum, 67020-5.
Restriction recommended (302).
Landlords, loans by, 67057-60.
Measures for lightening agriculture's burden of debt : enforcement of Usurious Loans Act, restriction of interest, adoption of principle of *damdopat*, publicity as to interest restriction, compulsory repayment at threshing time (302).
Mortgages :
Non-terminable, should not be prohibited (302).
Restriction not desirable unless holdings are made non-transferable (302) 67041-3.
Repayment :
Compulsion recommended (302) 67089-91.
Prevented by : keeping grain for better prices, high interest, bad storage arrangements, accumulated old debts (302) 67020-9.
Restriction or control of cultivator's credit, suggestions as to (302) 67041-3.
Sources of credit : moneylenders (302).
Usurious Loans Act :
Enforcement highly necessary (302) 67030.
Ignorance of, among cultivators, 67031, 67050-1.

AGRICULTURAL INDUSTRIES :

Basket making carried on (304).
Bee-keeping, ignorance of methods (304).
Charka for women recommended (304).
Cottage industries not requiring valuable machinery recommended (304) 67040.
Employment : large scale industrial concerns would not improve rural employment (304).
Instruction necessary (304).
Lac culture, ignorance of methods (304).
Leisure period :
in Patna district some cultivators work throughout the year while others have no work from July to September (304).
Obstacles : ignorance of methods (304).
Organisation of supply of raw materials and marketing recommended (304).
Paper-manufacture from rice straw suggested (304) 67052-3.
Pisciculture : villagers would not take interest in (304).
Poultry rearing : villagers would not take interest in (304).
Rope-making carried on (304).
Sericulture, ignorance of methods (304).
Spinning of cotton recommended (304).
Study, extensive, not recommended (304) 67036-40.

LAL, G.—concld.

AGRICULTURAL LABOUR, wages in kind, 67054-62.

ANIMAL HUSBANDRY :

Fodder : Rice straw :

Good, 67073-80.
Paper making from, effect upon supply, 67052-3.

CROPS AND CROP PROTECTION, pests : caterpillar, 67083, 67087.

CULTIVATION, Rotation, 67063-4.

FERTILISERS, cowdung, 67065-7, 67072 ; green manure, *sanai* or paddy, 67068-71.

HOLDINGS, Estates Partition Act (303) 67032.

Fragmentation, causes great loss of Efficiency (302-3) ; legislation recommended (303) 67032.

IMPLEMENTS, cultivators' conservative habits, 67036-9.

IRRIGATION :

Reservoirs recommended (303).
River training recommended (303).
Rivers, drying up (303) 67033-5, 67044-6.
Schemes suggested (303).

LAND TENURE, Bengal Tenancy Act, 67041-3.

MARKETING :

Storage of crops by cultivators waiting for better prices (302) 67020-9.
Subsidiary industries : organisation required (304).

SOILS :

Alkali land : irrigation recommended (303).
Erosion, drainage, levelling, and ridging recommended (303-4).
Improvement : methods recommended (303).
Reclamation, groundnut and til cultivation recommended (303).

LAMBERT, H., M.A., I.E.S., Officiating Director of Public Instruction, Bihar and Orissa.

BLAIR, F. R., M.A., I.E.S., Deputy Director of Public Instruction, Bihar and Orissa (316-34) (*See also* **FAWCUS**, witness).

CO-OPERATION, educational work very small, 67246.

EDUCATION :

Adult :

Literacy certificates not given, 67285-6.
Night schools mainly, 67203-17, 67274.
Supervision, 67359.
Text books, the same as used in primary schools, 67283-4, 67360.
Agricultural : Experimental agricultural classes at middle schools proposed, 67222-4.
Banki Union :
Attendance Officer, 67350-1.
Compulsory primary education, 67198-202, 67250-4 (334).
Compulsory :
Banki Union, see above.
Contracting-in system, 67280-2.
Demand for, 67225-6, 67273.
Difficulty of enforcing, 67235-6, 67252-4.
Experiments in, 67227-31, 67250-1.
Financial difficulty, 67355.
Selective, 67299-300.
Co-operative movement : doing very little (323).
English, great demand for, 67225.

LAMBERT, H. & BLAIR, F. R.—contd.

EDUCATION—*contd.*

Female :
at Boys' schools, 67356-7.
Importance of, 67217-20.
Finance, 67301-4, 67305-16, 67319-31, 67353-5, 67363-75.
Garjat State, experience in, 67237-45.
Grants, conditions of recognition of schools, 67301-4.
Hygiene difficulty in teaching, 67287-90.
Legislative Council's favourable attitude, 67317-8.
Literacy, 67277-9, 67285-6, 67295, 67361-2.
Middle class, education of, 67247-9.
Middle schools : shopkeeping classes prefer, 67291-5.
Permanent settlement, in relation to educational finance, 67369-71.

Primary :
Attendance, 67232-4, 67237-45, 67264-7, 67269-72, 67280-2, 67296-300, 67352.
Comparative expenditure on, 67363-8, 67372-5.
District boards control, 67269-72, 67301-4, 67348-9.
Fees, 67353-4.
Free, financial difficulty, 67305-16.
One-teacher schools, 67301-4.
Pupils mainly from cultivating classes, 67291-2, 67295.
Ratio between numbers of teachers and boys, 67301-4, 67352.
Schemes, procedure as to, 67332-47.
Statistics, 67232.
Propaganda : 67273-4.
Public Health Department, touch with, 67287-90.
Teachers :
Pay, inadequate, 67319-31.
Supply inadequate, 67275-6.
Women, difficulty as to, 67220-1.
Text-books :
for Adult and primary schools the same, 67283-4.
Committee, 67255-63, 67268.
for Urban and rural schools the same, 67358.

LANDLORDS, *see under* **LAND TENURE.**

LAND TENURE :

Batai system, *Heycock*, 66671.
Bengal Tenancy Act, *Tuckey* (278), *Sinha, D. P.*, 66518, 66531, *Heycock*, 66737, 66745, *Lal*, 67041-3.
Capitalist land monopoly, danger of, *Arikshan Sinha* (262) (271-2) 66840-2.
Cesses, illegal, imposed by landlords, *Sinha, D. P.* (203) 66514-8.
Chota Nagpur Tenancy Act, *Tuckey* (279) 66904-5.
Co-operative movement, effect upon position of tenants, *Tuckey*, 66896-7.
Cultivators becoming landless day-labourers, *Ganga Vishnu*, 65331-3, 65368-70.
Dispossession of ryots, *Tuckey* (279-80).
Firewood scarcity caused by law as to ownership of trees, *Arikshan Sinha* (265).
Government's policy criticised, *Sinha, D. P.* (197) 66514-8.
Improvements of land discouraged by present system, *Sinha, D. P.* (208) 66531.
Inheritance laws : discourage improvements, *Dobbs*, 65522-4.
Insecurity of, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Intermediaries between landlord and tenant, *Heycock*, 66735-6.

LANDLORDS :

Absentee, *Sethi*, 67528, *Ghose*, 67672-3, *Roy, S. K.* (457).
Capital, *see under that heading.*
Co-operation, landlords' inertia an obstacle to, *Ganga Vishnu* (38).
do not Cultivate, *Heycock* (217-8).
Education of :
Compulsion recommended, *Roy, S. K.*, 68251-4.
Lack of, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Short period courses at provincial farms recommended, *Sinha, D. P.* (200).
Sons, *Heycock* (217-8) 66559-62, 66701-7, *Khan* (442).

LAND TENURE—contd.

LANDLORDS—*contd.*

Grazing : obstruction by, *Arikshan Sinha* (269).
Illegal demands made by, *Heycock*, 66686-90.
lack of Interest in agriculture, *Sinha, D. P.* (205), *Heycock* (218) (223) 66559-63, 66663-4, 66701-7, *Sethi* (359) 65526-7, 67654-6, *Ghose*, 67663-76, *Narendra*, 67837-40.
Irrigation, control of, leads to oppression, *Sinha, D. P.* (204) 66537-40.
Loans by, *Lal*, 67057-60.
make grain Loans which are beneficial, *Prasad* (162).
Oppression of tenants, *Dobbs* (56) (66), *Sinha, D. P.* (203) 66517, 66537-40, *Tuckey* (280-1) (286-7) 66871-6, 66917-8, 66958, *Dobbs* (66) (*See* Rent-receipts *and Thikadari, below*).
Propaganda :
Among, recommended, *Ghose*, 67669-71, *Khan* (449).
By, recommended, *Sethi* (351), *Khan* (443).
Are primarily Rent collectors, *Heycock* (217-8) 66708.
Sawai system, *Prasad* (162).
Sub-division, excessive, of proprietary interests, *Heycock* (221).
Mortgages, *see under* **AGRICULTURAL INDEBTEDNESS.**
Orissa Tenancy Act, *Tuckey* (280).

PERMANENT SETTLEMENT :

Bad effects of, *Foley* (225-6) (253-4).
Bery, 67185-91.
Discourages improvements, *Dobbs*, 65522-4.
in relation to Educational finance, *Lambert* and *Blair*, 67369-71.
Effects of, *Heycock* (217-8) (223) 66607-15, 66617, 66663-4, 66669-75, 66734, 66746-8, 66757-71, 66777, *Narendra* (409) 67861-9, 67889-94, *Tuckey* (278) (280) 66868-70, 66920, 66965-9.
Pradhani system in force in Santal Parganas, *Foley* (225).
Price of land increasing, *Ganga Vishnu*, 65326-33, *Arikshan Sinha*, 66823.
Proprietors' private lands, *Tuckey* (278).
Relations between landlords and tenants, a serious obstacle to agricultural improvements, *Tuckey*, 66898, 66921-3.

RENT :

Amount, *Ganga Vishnu*, 65304-6, *Atkins*, 65264-7, *Ghose* (395) 67812-5.
Cash rents, *Heycock*, 66650-61, 66778-9, 66782-4, *Dobbs*, 65522-4.
is Increasing, *Arikshan Sinha*, 66823.
Produce Rent :
Area, very large, *Heycock* (221).
Commutation :
has Improved position of cultivators, *Khan* (453).
question of, *Tuckey* (285).
wanted by Tenants but opposed by landlords, *Heycock* (221) 66580-2, 66650-61, 66778-9, 66782-4.
Cultivators, legal occupancy rights not usually recognised, *Tuckey* (278) 66946-7.
Disadvantages of system, *Heycock* (221) 66574-82, 66650-61, 66669-75, 66691-9, 66782-4.
Half the gross produce, *Heycock* (221) 66574-82.
Importance of problem, *Tuckey* (278).
Irrigation :
Adversely affected by, *Heycock* (221) 66606, 66650-61, 66698-9, 66746-8 (255).
Effect upon, *Tuckey* (279).
Output adversely affected, *Tuckey* (278-9) 66921-3.
Rental value of land : about 50 per cent of the produce, *Dobbs*, 65478-85.
Rent-receipts not given, *Tuckey* (280) 66873-6, 66892-5, 66959-62.
Resumption by superior landlords in the event of failure of heirs, hinders improvement of land, *Roy, S. K.* (469).
Sub-division of proprietary interests, *Tuckey* (278) (286-7) 66890-1, 66898, 66921-3, 66940-7.
Survey, *Tuckey* (281).
System, *Sinha, D. P.* (208).
Tenancies, *Tuckey* (283-4) 66946-7.
Tenancy Acts should be amended to prevent fragmentation, *Narendra* (409).
Tenancy Bill, *Heycock*, 66760.
Tenancy law, complicated, *Tuckey* (277-8) 66919.

LAND TENURE—contd.

Thikadari system, *Tuckey* (286-7) 66890-1, 66898, 66921-3, 66955-7, 66962.
Transfer of occupancy rights is subject to consent of landlord, *Heycock*, 66686-90, 66731-2, *Tuckey* (278-80), *Ghose* (395); should be conferred on tenants, *Arikshan Sinha* (261).
Transfer of land should be facilitated, *Dobbs* (59).

LITIGATION, *see under* **WELFARE OF RURAL POPULATION.**

LOHAT SUGAR WORKS, *see under* **HENRY.**

LYALL, J. H., B.A., Officiating Conservator of Forests, Bihar and Orissa (416-29). (*See also* **GIBSON**, witness.)

ADMINISTRATION:

Transport: communications necessary to enable agriculturists to make full use of forests, 67896-7.

AGRICULTURAL INDUSTRIES:

Lac culture, 67962, 67976.
Paper-making: *Sabai* grass used, 68012-4.
Rope-making, grass used, 67909-10.

ANIMAL HUSBANDRY:

Cattle: number excessive, 67963-5.
Stall feeding recommended, 68015.

FORESTS:

Agricultural purposes:
Communications, improved, necessary for full use of forests, 67896-7, 67909, 67915-7.
Relations between forest officers and agriculturists, 67930-2, 68015-29.
Area, dangerously small, 67918-22, 67966-70.
Bamboo: village plantations common in certain areas, 67947-51.
Burning: deforestation caused by, 67997.
Charcoal burning industry:
Communications necessary, 67915-7.
Failed, 67915-7, 68012.
Classification, 68008-9.
Conservation:
Catchment areas, 68005-7.
Difficulty of, 67925-7.
Legislative Council's opposition, 67981, 67998-68000, 68020-3.
Panchayat control discussed, 67925-7.
Deforestation:
Causes, 67997.
Erosion caused by, in Chota Nagpur, 67933-43, 67982-3.
Serious, 67978-83.
Firewood collection allowed in forests in which grazing is prohibited, 67899.
Grass:
Cutting:
Allowed but not practised, 67904-14, 67960-5.
Fees charged, 67990-3.
Propaganda suggested, 68015-29.
Paper-making, used for, 67909-11, 68012-4.
Rope-making, used for, 67909-10.
Spear grass, 68010-1.
Grazing:
Deforestation caused by, 67997.
Diminution probable in the future, 67984-6.

LYALL, J. H.—contd.

FORESTS—*contd.*

Fees, 67901-3.
Prohibited areas, 67899, 67976-7.
Propaganda in favour of stall feeding recommended, 68015-29.
Sheep, very little, 67987-8.
Lac culture, 67962, 67976.
Leaves used as manure, 67928-9.
Minor :
Enclosure recommended, 67923-4, 67976-7.
Estate agency duties of forest officers, 67971-5.
Yielding charcoal, fuel and poles, spear grass, 68008-11.
Panchayats, control by, suggested, 67925-7, 68001-4.
Private :
being Destroyed, 67922.
Control by Government suggested, 67592, 67994-5, 67998-68000.
Reserve : open lands in, 67989.
Rights, difficulty of defining, 67940-3.
Sal tree, 67997.
Service :
Duties, 67971-5.
Special, for agricultural areas, suggested, 67944-6.
Training, 67996.
Timber forests, 67898, 68009.
Village tree plantation : not practised, 67944-59.

MALARIA, *see under* **WELFARE OF RURAL POPULATION.**

MANURE, *see* **FERTILISERS.**

MARKETING :

Agricultural associations should form a trading federation, *Khan* (451).
Agricultural Department should assist cultivators, *Heycock* (219).
Ammonium phosphate and Ammonium sulphate, marketing organisation necessary, *Dobbs*, 65449, 65558-9.
Cattle : exported to Bengal, *Ganga Vishnu* (40) 65294, 65351-2.
Communications, lack of, hampers marketing, *Sethi* (352).
Co-operative, *see* MARKETING *and* SALE SOCIETIES *under* **CO-OPERATION.**
Crop improvements : marketing facilities necessary, *Ghose* (383).
Dalals, *Prasad* (164).
Employment, rural, could be increased by organisation of markets, *Sinha, D. P.* (206).
Exporters : wide activities of, *Sinha D. P.* (206).
Facilities :
Dobbs, 65448-51.
Markets, no lack of, *Sinha, D. P.* (206), open markets necessary, *Prasad* (164).
not Satisfactory, *Prasad* (164), *Sethi* (360), *Ghose* (389), *Khan* (451).
Federation of village co-operative societies :
Finance, *Roy, S. K.* (464) 68255-60.
State control discussed, *Roy, S. K.* (464) 68249-50.
Suggested, *Roy, S. K.* (464).
Forward sales of crops before harvest, unfavourable to cultivators, *Prasad* (166).
Fruits : railways, difficulty of distance from, *Arikshan Sinha* (270).
Grading recommended, *Khan* (451).
Improvement, considerable, necessary, *Heycock* (223).
INFORMATION being placed at disposal of cultivators, etc. :
Government should distribute gratis, *Sinha, D. P.* (207).
Ignorance of cultivators of price variations, *Sinha, D. P.* (207).
as to Lac, recommended, *Norris* (479).
absolutely Necessary, *Prasad* (164).
as to Prices should be exhibited to cultivators at post offices, *Sethi* (352-3) 67517-8.
Lac, *Norris* (477) (479).

MARKETING—contd.

MARKETS :

no Lack of, *Sinha, D. P.* (206).
Open markets necessary, *Prasad* (164).
Village markets :
Fertilisers, should be utilised to popularise, *Sinha, D. P.* (204).
as to Food crops and vegetables satisfactory, *Arikshan Sinha* (270).
as to Money crops, difficulties, *Arikshan Sinha* (270).

MIDDLEMEN :

Commissions excessive, *Khan* (451).
Dalals, *Prasad* (164), *Khan* (451).
a Necessary evil, *Prasad* (164).
Number excessive, *Prasad* (164), *Ghose* (389).
Profits excessive, *Ghose*, 67678-9.
Wholsalers, *Norris*, 68332-4.

MONEYLENDERS :

as Middlemen, employ questionable methods, *Atkins* (21) 65261-3.
Sale of produce to, at low prices, *Sethi* (360).
of New crops, arrangements necessary, *Ghose* (383), *Roy, N. K.* (487).

PRICES :

of Lac, reduction recommended, *Norris* (479).
Stabilisation of, *Roy, S. K.* (463-4).
of Sugar and sugarcane, *see* SUGARCANE *under* **CROPS AND CROP PROTECTION.**
Purity of lac, *Norris* (477-8) 68331.
Quality would be improved by better marketing facilities, *Ghose*, 67678-9.
Roads, *see* TRANSPORT *below.*
Storage of crops by cultivators waiting for better prices, *Lal* (302) 67020-9.

SUBSIDIARY INDUSTRIES : (*See also* **AGRICULTURAL INDUSTRIES.**)

Arrangements necessary, *Sinha, D. P.* (206), *Ghose* (387).
Organisation required, *Lal* (304).
Prevented by lack of marketing organisation, *Tuckey* (285), 66951-4.

SUGARCANE :

Competition between mills and local market for *gur*, *Henry*, 64958-60.
Deteriorates after 48 hours, *Henry*, 64973-4, 64987.
Factories, limitation of number advocated, *Henry*, 64961-2, 65031-4.
Price, fixed by reference to price of sugar, *Henry*, 64957, 65037-8, *Meyrick*, 68121-6, 68133, 68138-42, 68180-3, *Ganga Vishnu*, 65272-4.
Quality : impossible to pay by sucrose value, *Henry*, 64921-9, 64988-91.
Survey not attempted, *Dobbs*, 65448.

TRANSPORT : (*See under* **ADMINISTRATION.**)

Lack of, adversely affecting prices of produce, *Henry* (5).
Railways : difficulty of distance from, in transport of fruits, *Arikshan Sinha* (270).

Roads :

Absence of, compelling dependence upon middlemen, *Sinha, D. P.* (202).
Required, *Ghose* (377) 67688-9.
Weighing : Neutral tallymen suggested, *Ghose*, 67678-9.
Wholesalers, *Norris*, 68332-4.

MATCHES, MANUFACTURE OF, *see under* **AGRICULTURAL INDUSTRIES.**

METEOROLOGICAL DEPARTMENT, *see under* **ADMINISTRATION.**

MEYRICK, N., General Secretary, Bihar Planters' Association, Ltd., Motihari, Bihar and Orissa (429-40).

MEYRICK, N.—contd.

AGRICULTURAL DEPARTMENT :
Pusa, work at, 68084-9.
Sugarcane work inadequate (429) 68102-9.

AGRICULTURAL INDUSTRIES : Sugar manufacture : Government factories not recommended, 68074-9.

ANIMAL HUSBANDRY : Cattle breeding : Pusa cross-bred bullocks commended, 68096-9.

BIHAR PLANTERS' ASSOCIATION :
Agricultural Department, no help received from, 68108-9.
Indigo :
Cess abolished, 68035, 68100.
Medicinal use, 68040-2.
Research in, the chief object originally, 68033-7.
Synthetic, 68038-45.

CAPITAL, ATTRACTING OF, TO AGRICULTURE :
Landlords' lack of capital, 68046-50.
Planters' capital requirements, 68054-70, 68134-5, 68143, 68151-8, 68168-79, 68184-9 (504 A).

CROPS AND CROP PROTECTION :
Indigo, *see under* BIHAR PLANTERS' ASSOCIATION.
Sugarcane :
Cost of Production :
to a European Planter in North Bihar, (504 A).
to a Ryot in North Bihar, (504 A).
Deterioration, 68127-9.
Extension, scope for (429-30) 68102-33, 68180-3.
Manure necessary, 68130-2.
Outturn, 68138-42, 68147-50, 68151-8.
Price, 68121-6, 68133, 68138-42, 68180-3.

DEMONSTRATION AND PROPAGANDA :
for Small scale production recommended, 68144-6.

EDUCATION :
Middle class youths, attracting of, to agriculture :
Planters' capital requirements, *see under* CAPITAL *above*.

FINANCE :
Imperial Bank of India should be enabled by Government to advance money on immovable property (429) 68046-53.
Land mortgage banks recommended, 68051-3.
Planters' captial requirements, *see under* CAPITAL *above*.

RESEARCH :
Indigo, 68033-7.
Pusa :
Bullocks, 68096-9.
Provincial Department's work partly done by, 68084-9.
Suggestions as to, 68032, 68094-5, 68144-6.
Sugar Bureau :
Cable service valuable, 68080-3.
very Efficient, 68084.
Sugarcane :
Central bureau controlling experiments recommended, 68071.
Extension recommended, 68102-33.
Farm, experimental, near Pusa recommended, 68032, 68094-5, 68144-6.
Government experimental stations require more funds (429).
Publication of technical information recommended, 68072-3.
Pusa, 68085-9, 68144-6.

TARIFFS AND SEA FREIGHTS : Sugar, temporary import duty to prevent dumping necessary (429-30) 68110-21, 68180-3.

MEYRICK, N.—contd.

VETERINARY :

Dispensaries :
District boards do not provide sufficient funds (429) 68136-7, 68159-68.
Expansion inadequate (429) 68136-7, 68159-68.
Provincial control, transfer to, recommended (429) 68159-68.
Inoculation : cultivators willing, 68137.

MIDDLE CLASS YOUTHS, *see under* **EDUCATION.**

MIDDLEMEN, *see under* **MARKETING.**

MONEYLENDERS, *see under* **AGRICULTURAL INDEBTEDNESS.**

MORTGAGES, *see under* **AGRICULTURAL INDEBTEDNESS.**

NARENDRA, BABU BIRBAR NARAYAN CHANDRA DHIR, Garhmadhupur, District Cuttack (407-15).

Administration : Retrenchment recommended (409) 67861-9, 67889-94.

AGRICULTURAL DEPARTMENT :

Profits resulting from improved implements and materials should be examined (408).
Services : not satisfactory (408).

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : decreasing yield from land, large families, increased cost of living (408).
Creditors, " close-fisted " treatment by, deprecated (408).
Measures for lightening agriculture's burden of debt : control of exports and imports and administrative economy recommended (408-9) 67861-9, 67889-94.

AGRICULTURAL INDUSTRIES :

Cottage industries recommended (411).
Leisure period : cultivator only works 6 months in the year (411).
Protection by import tariffs recommended (411) 67845-60.
Training necessary (411).

AGRICULTURAL LABOUR :

Cost increasing owing to scarcity (411).
Migration to towns causing scarcity (411).

ANIMAL HUSBANDRY :

Bulls should be maintained by district boards and municipalities (408) (410).
Export of cattle should be discouraged (408).
Fodder, shortage in Orissa from March to June and from August to October (410) 67870-2.
Pastures, common :
Overstocked (410).
Shortage of (408) (410).
Silage recommended (408) (410).

CROPS AND CROP PROTECTION :

Flood-resisting crops necessary (409).
Fodder crops recommended (409).
Wild animals, damage by : extension of gun licenses recommended (410).

DEMONSTRATION AND PROPAGANDA :

Farms necessary (407-8).
Improved methods, etc., cost difficulty (408).
Profits, possibility of increasing, should be demonstrated (407-8).

NARENDRA, B. N. C. D.—contd.

EDUCATION :

Agricultural :
after-careers of students, not on the land, 67873.
Indigenous methods recommended (407).
Practical training recommended (407).
Text books, should be used with caution (407).
Compulsory primary education recommended (411).
Nature study, school farms and school plots, as at present organised, are useless (407).
System criticised (407) 67873.

FERTILISERS : Cowdung, use of, as fuel, due to shortage of firewood (409).

FINANCE : Taccavi loans for purchase of implements, suggested (408).

FORESTS :

Afforestation necessary (409) (411).
Cultivation on forest lands prohibited (411).
Grazing : facilities inadequate (411).
Reservation rules should be relaxed (409) (411).

HOLDINGS : Tenancy Acts should be amended to prevent fragmentation (409).

IMPLEMENTS :

Cattle not strong enough to pull improved ploughs, 67881-5.
Co-operative assistance suggested (408).
Importation, on account of cost, not recommended (410).
Manufacture, local, difficult owing to high cost of materials, and village smiths and carpenters being driven to the towns (410) 67841-4.
Poverty prevents use of implements and machinery (410).
Repairs, difficulty of, 67881-5.
Taccavi loans recommended (408).

IRRIGATION : Canals in Orissa not recommended (409).

LAND REVENUE (409) 67861-9, 67889-94.

LAND TENURE :

Landlords, some lack interest in agriculture, 67837-40.
Tenancy Acts should be amended to prevent fragmentation (409).

SOILS :

Drainage necessary (409).
Floods : (410) 67841-4.

TARIFFS AND SEA FREIGHTS : Protection recommended (411) 67845-60.

VETERINARY :

Contagious diseases, legislation recommended (410).
Department : services not satisfactory (408).
Indigenous methods :
Co-ordination with Western methods recommended (408).
should be Examined (407) (410).
Research necessary (407) (410).

WELFARE OF RURAL POPULATION :

Health improvement : economic improvement and spread of literacy necessary (411-2).
Litigation (409) 67886-8.
Population : large families causing poverty (408) (411).

NATURE STUDY, *see under* **EDUCATION.**

NORRIS, Mrs. R. V., Director and Bio-Chemist, Lac Research Institute, Namkum (476-82).

CO-OPERATION : Lac central marketing agencies suggested (479) 68314-5.

LAC : (*See also under* AGRICULTURAL INDUSTRIES).

Cess (476) 68337-44.
Co-operative organisation of village cultivators recommended (479) 68314-5.
Cottage industry (477).
Cultivation, suggestions for improvement (478).
Finance : loans to cultivators suggested (479).
Governments, Provincial :
should give Assistance (478-9).
Brood farms in Bihar and Orissa (479) 68345-6.
Importance of industry (476).
Indian Lac Association for Research :
Committee representation (479) 68309-12, 68340.
Finance (476) 68325-30, 68337-44.
no Government control, 68340-4.
Institute, 68307-8, 68313, 68320-3.
Objects (476) 68331.
Manufacture, small scale (478).
Marketing :
Central co-operative agencies suggested (479) 68314-5.
Fluctuations (477) (479) 68350.
Information as to prices, publication recommended (479).
Prices : reduction would be beneficial (479) 68316-9, 68324.
Purity, standards of (477-8) 68331.
Wholesalers, 68332-4.
Parasites, research as to, necessary, 68347-9.
Synthetic (476-7) (479) 68316-9, 68332-4, 68351-2.
Tree hosts, 68321-3, 68335-6.
Uses (477) 68328.

OILCAKE, *see under* **FERTILISERS.**

OIL-PRESSING, *see under* **AGRICULTURAL INDUSTRIES.**

PANCHAYATS :

Arbitration by, advised, *Atkins* (20).
Co-operative, *Heycock* (223).
Forests, *Lyall*, 67925-7, 68001-4.
Village *panchas*, should have status of *panchayats*, *Atkins* (20).

PAPER, *see under* **AGRICULTURAL INDUSTRIES.**

PASTURES, *see under* **ANIMAL HUSBANDRY.**

PESTS, *see under* **CROPS AND CROP PROTECTION.**

PHILLIPS, Lt.-Col. J. A. S., I.M.S., Officiating Director of Public Health, Bihar and Orissa (335-7).

ADMINISTRATION : Union boards recommended (336-7).

CO-OPERATION : health societies recommended (336).

EDUCATION : hygiene : in schools, teaching recommended (335).

FINANCE : taccavi grants should be conditional upon village being kept clean (336).

WELFARE OF RURAL POPULATION :

Drinking water : closed well with pump recommended (336).
Health weeks recommended (335-6).
Hygiene : Propaganda on market days, and lectures, recommended (355).
in Schools, teaching, and text books, necessary (355).

PHILLIPS, J. A. S.—contd.

WELFARE OF RURAL POPULATION—*contd.*

Model villages recommended (335-6).
Sanitary conditions of villages :
Boy scouts recommended (336).
Co-operation suggested (336).
Importance of (335).
Prejudice of villagers (335).
Prizes suggested (336).
Taccavi should be conditional upon (336).
Union boards :
Clerks should be qualified sanitary or health inspectors (336-7).
Recommended (337).

PISCICULTURE, *see under* **AGRICULTURAL INDUSTRIES.**

POPULATION, *see under* **WELFARE OF RURAL POPULATION.**

POSTS AND TELEGRAPHS, *see under* **ADMINISTRATION.**

POULTRY, *see under* **AGRICULTURAL INDUSTRIES.**

POVERTY, *see under* **WELFARE OF RURAL POPULATION.**

PRASAD, RAI BAHADUR DURGA, M.A., Registrar of Co-operative Societies, Bihar and Orissa (159-97).
Experience, 66034-9, 66385-90.

ADMINISTRATION :

Transport :
Communications, bad, not a handicap to expansion of co-operative movement, 66400.
Roads, village, neglect of, by district boards (161) 66459-60.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : Pressure of population, usury, litigation (161-2) 66454-7. cattle mortality, etc. (161-2).
Grain loans :
Interest 50 per cent, 66364-8.
Preferable to cash (162) 66369-70.
Kist Kothis (loan offices) (162).
Landlords make grain loans which are beneficial (162).
Measures for lightening agriculture's burden of debt :
Co-operation only (162).
Moneylenders :
Dishonest, usurious and relentless (162) 66364-8.
Interest rates :
have been Reduced below those of co-operative societies (165) 66461-4, 66468-70.
24 per cent and on grain loans 50 per cent, 66364-8, 66461-4.
Repayment prevented by apathy of borrowers (162).
Sources of credit : moneylenders including landlords, co-operative societies (162).
Usurious Loans Act, 66450-2.

AGRICULTURAL INDUSTRIES :

Basket-making : carried on ; improvement necessary (163).
Co-operative supply of implements and raw material, and marketing, recommended (163) 66306-11.
Education in agricultural schools recommended, 66377-9.
Finance : Government help recommended (163).
Ghi-making carried on (163) 66360-3.
Health conditions, devotion of spare time to improving : formation of unions under Village Administration Act, 1892, recommended (164) 66380-1.
Industrial concerns, moving of, into rural areas, should be avoided (164) 66343-5.
Industries Departments should assist (163) (171-2).

PRASAD, D.—contd.

AGRICULTURAL INDUSTRIES—*contd.*

Knitting for women recommended (163).
Lac cultivation: would be profitable in Chota Nagpur (163).
Lace-making for women recommended (163).
Leisure period: Cultivators generally employed for 8 months; off season from April to June (163).
Milk industry recommended (163).
Oil-pressing recommended (164).
Organisation: lack of (163).
Paper-making from rice straw, industry should be established (164).
Population, pressure of: subsidiary occupations necessary (161-2).
Poultry rearing: not acceptable to Hindus (163).
Preparation of agricultural produce for consumption, industries connected with, should be encouraged by Government (164).
Rice-hulling recommended (164).
Rope-making carried on (163).
Spinning recommended (163).
Study, intensive, urgently called for (164).
Weaving recommended (163) 66214-23, 66348-55.

ANIMAL HUSBANDRY:

Cattle breeding: co-operative societies take no interest in (167) 66375.
Draught cattle, cost of hiring, 66463.
Milk societies recommended (163) (167)
Mortality of cattle:
Heavy (162).
Indebtedness caused by (161-2).

CO-OPERATION:

Arbitration, 66454-7.
Audit:
Cost should be borne by Government (164) 66409-11.
Federation and Government servants carry out, 66172-86.
Bell-metal societies:
Over production danger (172).
Successful (172).
Capital (170) 66060-80, 66252-78, 66319-25.
Cattle breeding:
no Interest taken in, 66375.
Societies recommended (167).
Central Banks:
Capital, 66060-80, 66252-78, 66319-25.
Collectors as Chairman, 66293.
Demonstration and propaganda (160) 66083-7, 66306-11, 66426-30.
Directors, 66094-9, 66334-9.
Dividend, 66265-7.
Dues, difficulty of collection, 66431-2.
Function: to facilitate operations of primary societies, 66306-11.
Government financial assistance recommended (165).
Interest:
charged, 66090, 66272, 66304-5.
paid, 66068-80.
Management: 66113-33, 66140-51, 66252-62, 66301-3, 66330-3, 66389-95.
Political dissension, 66431-9.
Primary societies:
Financing of, 66439-49.
More needed, 66294-7.
Scope of activities (164) 66059, 66083-7, 66129-33, 66306-11, 66328-9, 66373-4, 66426-30.
Shareholders:
Ordinary, are primary societies, 66094-112.
Preference, are individuals, 66102-12.
Voting, 66285-7, 66393-5.

PRASAD, D.—contd.

CO-OPERATION—*contd.*

Central Banks—*contd.*
Staff : 66138-9.
Supervision, lack of, 66438.
Use of loans supervised by, 66092-3, 66336-9, 66477-80.
Colonies to attract middle class youths to agriculture recommended (159) 66189-204.
Consolidation of holdings societies (167).
Credit facile, danger of (161) 66090.
Credit Societies :
Liability unlimited, 66173, 66449.
Loans :
Administered by Management Committee, 66051-8, 66279-84.
Arrears (162) 66129-33, 66138-9, 66346-7, 66382-4.
Grain loans, 66369-70.
Supervised by Central Banks, 66092-3, 66279-84, 66440-9.
Management in hands of Central Banks, 66149-51, 66156, 66288-9.
Managers for every 100 societies, 66244-51.
Needs (165) 66288-9, 66346-7.
Reserves, invested with Central Banks, 66060-7, 66319-25.
Sufficient for long and short term credit requirements of cultivators (161) 66205-13.
Demonstration and propaganda : important work of movement (160) 66306-11, 66371-4, 66426-30.
Deposits: *See* Capital *above.*
Education :
Adult, agricultural, should organise (160).
District boards not assisting sufficiently, 66298-300.
Members not properly educated, 66042-7, 66188, 66205-8.
Non-official agencies recommended (164) 66312-8.
Sabour training class (165) 66246-9, 66418-22.
Schools (160) 66376-9.
Embezzlement :
Decreasing, 66134-7.
Serious, 66437.
Federation :
Audits, 66179-86.
Central body of the movement, 66157-8.
Control over Central Banks should be more effective, 66301-3.
Development committees recommended (165-6).
Development officer, 66418-22, 66471-6.
Funds inadequate (165).
Itinerant lecturers should be entertained by (165).
Meetings, 66159-64.
no Relationship with Government departments, 66423-5.
Sabour training classes (165) 66246-9, 66418-22.
Subsidies from Government for propaganda recommended (165) 66423-5, 66471.
Work of (165) 66084, 66179-86, 66306-11.
Grain golas (162) 66187, 66369.
Guaranteeing unions :
Failure generally, 66167-9, 66175, 66413.
Number, 66416-7.
Organisation of, recommended, 66412-7.
Honorary organisers : insufficient, 66238-41, 66326-7, 66340, 66454-7, 66484.
Improvement societies (167).
Interest :
Moneylenders rates :
Reduced below that of societies (165) 66088-91, 66468-70.
Societies have caused reduction (167) 66088-91, 66461-4.
should be Reduced (161) (165) 66088-91, 66272, 66304-5, 66369-70, 66468-70.
Irrigation :
Minor Irrigation Works Act, 1922 (167).
Siris power pump society taken over by Agricultural Department (167).
Joint farming societies recommended (163) (167).
Khunti welfare society, 66483-4.
Land mortgage banks, not necessary (161).

PRASAD, D.—contd.

CO-OPERATION—*contd.*

Liquidation, 66171-8, 66290-2, 66341-2.
Lyall Committee of 1921 (164).
Management: not satisfactory, 66048-58, 66113-33, 66140-51, 66156.
Meetings, 66048-50, 66159-66.
Milk societies recommended (163) (167).
Minorities, compulsion of, for schemes of joint improvement:
Minor Irrigation Works Act of 1922 (167).
Recommended (167).
Non-official agencies:
Honorary organisers, *see* above.
Subsidies from Government recommended (164).
Work: Propaganda, training of staffs, education (164).
Objects:
Moral advancement included, 66312-8, 66391-2, 6640I.
of Secondary societies, 66306-11.
Societies have partly achieved (167-8) 66039-44.
Political dissension, 66431-9.
Progress:
Financially sound, 66039-41.
not Genuinely co-operative, 66039-44, 66188.
Members over 200,000 in 7614 primary agricultural societies equal to 3½ per cent of agricultural families (161).
Obstacles, 66396-400, 66465-7.
Standard achieved, 66405-7.
Stationary, 66152-6.
Propaganda:
Extent of, 66081-7, 66371-5, 66471-6.
Formation of primary societies preceded by, 66402-4.
Non-official agencies recommended (164).
Provincial Bank:
Functions, 66252-62, 66306-11.
Long-term loans should be provided by Government (165) 66205-13.
Public Demands Recovery Act, amended, 66290-2.
Purchase societies:
Agricultural:
Central Banks should start (166) 66306-11.
Development committees should run (166).
Difficulties (170-2).
Finance, Government aid necessary (166).
Government Resolution (169-72).
Manures, 66373-4.
Necessary (166) (169) (170-2).
Seeds, 66373-4.
Capital, restrictions as to (170).
Domestic:
Failed generally (165-6) (169).
Government Resolution (169-172).
not Necessary in rural tracts (166) (169-71).
Registrar:
Assistant:
Duties, 66242-3, 66244-51, 6640I.
Lyall Committee's recommendation (164).
Qualifications, 66227-8, 66250-1.
Audit, duties as to, 66409-11.
Central Banks, duties as to, 66140-8, 66385-90.
Deputy: qualifications, 66224-6.
Relationship with Government departments, 66426-30.
Registration:
Conditions, 66242-3.
Cost should be borne by Government (164).
Procedure, 66402-4.

PRASAD, D.—contd.

CO-OPERATION—*contd.*
Reserves:
Invested with Central Banks, 66319-25.
Plenty, 66060-7.
Sale societies:
Difficulties (166).
Recommended (164) (166).
Saving, home safes have been successful, 66481-2.
Staff:
of Government:
Inspectors, 66229-37.
Number (163-4) 66229-37.
Registrars: *see above.*
School should be maintained by Government (165).
of Societies:
large Augmentation necessary (161).
Training:
Inadequate, 66465-7.
by Non-official agencies recommended (164).
Subsidiary industries, should help (163) 66306-11.
Weavers societies: failed (171-2).
Welfare societies:
Progress of (167) 66483-4.
Recommended (167).
Crops and Crop Protection: seed distribution: by co-operative societies, 66371-4.

DEMONSTRATION AND PROPAGANDA:
Co-operative institutions, important work of (160) 66306-11, 66371-4, 66426-30.
on Cultivators own fields recommended (160).
Honorary workers recommended (160).
Leaflets and lectures, of little avail (160).
Programme, must be definite (160).

EDUCATION:
Administration: by managing committees representing district boards, Agricultural and Co-operative Departments and the peasant class, recommended (160) 66376.
Adult:
Co-operative agency recommended (160) 66306-11.
Difficulty of (160).
Finance from district boards recommended (160).
Agricultural:
Bias recommended (168).
Co-operative management recommended, 66376.
Schools:
None exist, 66376.
Recommended (159-60) 66376-9.
Subsidiary industries should be taught, 66377-9.
Finance: district boards should contribute (160).
Middle class youths, attracting to agriculture:
Colonies recommended (159-60) 66189-204.
Co-operative organisation recommended (159).
Court of Wards, land of, should be utilised (159).
Extent of desire to take up agriculture, considerable (159).
Finance, should be supplied by Government (159).
Government estates should be utilised (159).
Schools, agricultural, recommended (159-60).
Fertilisers: co-operative distribution, 66371-4.

FINANCE:
Taccavi:
Co-operative movement when extended will render taccavi unnecessary (161).
Delay deprecated (161).
should be Distributed by responsible Government officers only (161).

PRASAD, D.—contd.

HOLDINGS :

Consolidation :
Co-operation the only feasible method (162-3).
Obstacles to : landlords, conservatism, class differences, legal (163) 66356-9.
Joint farming, co-operative, recommended (163) (167).

Legislation :
as to Landlords recommended (163) 66356-9.
as to Minors, widows, etc., not called for (163).

LAND TENURE :

Landlords make grain loans which are beneficial (162).
Sawai system (162).

MARKETING :

Dalals (164).
Facilities : not satisfactory (164).
Forward sales of crops before harvest, unfavourable to cultivators (166).
Information, placing of, at disposal of cultivators, etc., absolutely necessary (164).

Middlemen :
not Honest (164).
a Necessary evil (164).
Number excessive (164).
Open markets necessary (164).

WELFARE OF RURAL POPUPLATION :

Litigation, has become the greatest curse of Bihar (161-2) 66456-7.
Population, pressure of, most potent cause of indebtedness (161-2).
Status improved by joining co-operative society, 66401.
Village Administration Act, 1892, extension recommended (164) 66380-1.

PUSA RESEARCH INSTITUTE, *see under* **ADMINISTRATION.**

QUINLAN, D., M.R.C.V.S., I.V.S., Director, Civil Veterinary Department, Bihar and Orissa (118-58).

ADMINISTRATION :

District Boards : Veterinary control (120-1) (126) 65772-9, 65858-9, 65966-13, 66005-115.
Reforms, have increased difficulties of improving livestock (126) 65726, 66008.
Transport : roads, good, essential for milk collection (126).

Agricultural Department : Cattle farms, 65764-6.

ANIMAL HUSBANDRY :

Agricultural Department's farms, 65764-6.
Buffalo : should be superseded by cow, 65749-50.
Bulls, stud, distribution, 65878-9, 65981-3, 66020.
Cattle Breeding : Crossing, 65739-41.
Districts, 65962-5.
Dual purpose recommended, 65739-55, 65874-5, 66020.
Farms advocated (126) 65981-3, 66016-20.
Profitable, 65876-81 (*See* Export *below*).
Sipaya, *see below.*
Suggestions for improvement (124) 65966-71.
Cinema films recommended (127).
Co-operative distribution of bulls and collection of milk recommended, 66020.

QUINLAN, D.—contd.

ANIMAL HUSBANDRY—*contd.*

Dairying:
Area suitable (125-6).
Breeding, effect upon, 65966-71.
Co-operative, advocated (126) 66020.
Cows, slaughter of, in towns deprecated (125) 65972-6.
Legislation necessary (126) 65894-905.
Milk:
Collection by Co-operative societies recommended (66020).
Demand for, 65743-8, 65756-9.
Roads, good, necessary for collection (126).
in Towns undesirable (125) 65894-905, 65972-6.

Education:
Extension advised, 66033.
of Villagers in hygienic measures better than curative methods of dealing with disease (127) 65725.

Export of cattle:
Estimated to be upwards of half a million head (125) 65877-81, 65962-5, 66021.
Rinderpest, an obstacle to, 65931-6.

Fodder:
Crops advised (128) 65998-66004.
Dry: usually none in cultivated areas in northern divisions (128).
Green, absence of, during dry season (128).
Inadequate (123) 65756-63, 65856-7.
no Research (119) (128) 65977-8.
Goat breeding: importance of (127) 65769-71.

Grazing:
Forests: *see under that heading.*
Grounds, of no benefit to cattle, 65998-66004.
Nutritional research necessary (119).
Research as to poisonous plants and grasses necessary (119).
Number of cattle: nearly 28 millions, 65925-9.

Pastures:
Common, seriously overstocked (127).
Enclosed, absence of (128).
Patna farm under Veterinary Department, 65869-70.
Policy of Government, 65767-8.
Price of cattle: increased since 1914, 65880-1.
Provincial Cattle Committee's policy (124) 65738-41.
Reforms have increased difficulties of improving livestock (126) 65726, 66008.
Sheep breeding:
large Export (127) 65807-9.
Importance of (127) 65769-71.
Silo advised (127-8) 65856-7.
Sipaya farm: buffalo breeding at, 65871-3.
Stall-feeding: practised in northern division, 65756-9, 65853-7, 65998-66004.
Uneconomic cattle: 50 per cent worth only price of skin and bones (127) 65916-9, 65925-30.
Value of cattle, 65925-9.
Zamindars, apathy of (128) 65815.

CO-OPERATIVE DEPARTMENT:

should distribute Bulls, 66020.
should collect Milk, 66020.
Veterinary relief, expansion should be undertaken by (121)(123) 65945-7.

Crops and Crop Protection: fodder crops for silage advised (128).

DEMONSTRATION AND PROPAGANDA:

Decorations, distribution among agriculturists recommended (129) 65813-5.
Farms for fodder crops and cattle breeding advised (129).

QUINLAN, D.—contd.

EDUCATION :

Animal husbandry :
Extension advised, 66033.
of Villagers in hygienic methods necessary (127) 65725.
Sabour Farm : public school for sons of zamindars advised (128)
Text-books, 65955.
Veterinary College at Patna :
Affiliation to University, of doubtful benefit, 65727-30.
Course, 4 years advised, 65727-30, 65948-54.
Curriculum, 65948-54.
Hygiene :
of Fundamental importance, 65725.
Professor of, must have highest qualifications, 65725.
to be Opened in 1929 (118) 65723-4.
Refresher courses recommended, 65948-54.
Research (118) 65829-30, 65845-51.
Staff, 65829-30.
Students :
Employment in Subordinate Service, 65819-23.
Supply adequate, 65816-8.
Veterinary staff, *see under* Veterinary *below*.
Veterinary State Scholars :
System unsatisfactory, 65984-92, 66026-7.
(*See* Staff *under* Veterinary).
Trained in England, 65731-7.

FORESTS :

Grazing :
Fees : should be high enough to exclude inferior stock (127).
Grass cutting preferable (127).
Restrictions :
Exclusion of uneconomic cattle advised (127).
of the severest kind Justified to preserve forests (127) 65810-2.
Silo advised (127).
Staff :
Inadequate (127).
Training of subordinates at Veterinary College, Patna, 65819-23.

VETERINARY :

Castration :
Age, the younger the better, 66029-32.
Religious difficulty decreasing (122) 65780-3, 65890-3, 65979-80, 65995-7.
College at Patna : *see under* Education.
Contagious diseases :
Legislation necessary but staff inadequate (122-3).
Notification, delay in (122) 65826-8, 65862.
Numbers of cattle affected (158).
Obstacles to dealing with (122).
Varieties, 65824-5.
Control of cattle diseases should be entirely central, 65835, 65843-4, 65884-9.
Co-operative Department should undertake expansion of veterinary relief (121) (123) 65945-7.
Department :
should not be under Director of Agriculture (119-20).
Dispensaries (*see below*) should not be controlled by 65906-13 (121).
Funds inadequate (120-1).
Policy of Government that it should be responsible for livestock and dairying, 65767-8.
Staff (*see below*).
Successful work (121-2).
Dispensaries :
in Charge of touring Assistants (120).
Control, by District Boards (120-1) 65772-9, 65906-13, 66005-15.
Number required, 66022.

QUINLAN, D.—contd.

VETERINARY—*contd.*

Dispensaries—*contd.*

Staff, inadequate (122) 66023-5.
Touring, doing good work, 65860-1.
Use of, by agriculturists, not full (122).
District Boards, veterinary control: *see under* **ADMINISTRATION.**
Facilities, 65882-3.
Foot-and-mouth disease, not very serious, 65852.
Government: should not be entirely responsible but should give grants (121).
Horses: veterinary stables unoccupied (122) 65951-4.
Hospitals:
Control system satisfactory (120-1) (*See* District Boards *under* **ADMINISTRATION**).
in Charge of Veterinary Assistant Surgeons (120).
Number required, 66022.
Inoculation:
Compulsion recommended, 65920-8.
no Fee charged (123).
Numbers and cost (156-7).
Religious objection being gradually overcome (122) 65863-6, 65920-4.
Season, 65993-4.
Serum (*see below*).
Simultaneous, should follow formulation of cattle improvement policy (123) 65792-806, 65956-61.
Inspector General of Veterinary Services necessary, 65834-44, 65884-9.
Legislation for control of contagious diseases (122-3).
Medical Research Fund Association: example of methods (124).
Muktesar:
Research spasmodic (118) 66033.
Serum (*see below*).
Staff inadequate (123-4).
Training, 65989-92.
Parasitic diseases most serious, 65824-5.
Private veterinary practitioner, no scope for, 65943-4.
Research:
Central: organisation with headquarters at Muktesar necessary (118).
Conditions, worse than 20 years ago (123) 66033.
Co-ordination, by Director of Muktesar Institute advised (118-9) (124) 65831-44, 65884-9.
no Facilities in the past in this Province (118).
Finance: Provincial, assisted by central funds, proposal (119) 65841.
Goats (127).
Provincial: laboratories necessary in some Provinces (118) (123) 65831.
Provincialisation of service: renders recruitment of suitable staff difficult, 65726, 65835.
Sheep (127) 65769-71.
Subjects suggested (119) (123).
Rinderpest, importance of, 65784-91, 65824-5, 65931-6.
Serum:
Cost (156-7).
Supply sufficient (123) 66028.
Staff:
Caste, importance of (122) 65777, 65780-3, 65979-80.
Inadequate (122-3) 65858-9, 65862, 65937-47, 66005, 66022-5, 66033.
Pay (120) 65913-5.
Training, 65731-7, 65883, 65984-92, 66026-7, 66033.
Superior Provincial Service:
Recruitment: 65731-7.
Training in England, 65732, 65984-92, 66026-7.
Superior Veterinary Officer with the Government of India: appointment necessary (124).

RAILWAYS, *see under* TRANSPORT *under* **ADMINISTRATION.**

RECLAMATION (*of land*), *see under* **SOILS.**

RAINFALL, *see under* **IRRIGATION.**

REFORMS, *see under* **ADMINISTRATION.**

RENT, *see under* **LAND TENURE.**

RESEARCH :

Administration, *Dobbs* (49-53).
Agricultural Adviser, proposed status of, *Dobbs* (111-2).
Board of scientific advice and research recommended, *Roy, S. K.* (459).
Central :
Chief institutions should be, *Sinha, D. P.* (198).
Fundamental research, *Sinha, D. P.* (198) 66489-90.
Central Government should control and finance, *Ghose* (374) 67677.
Chemical research recommended, *Roy, S. K.* (456-7) 68291-2.
Continuity preserved, *Dobbs*, 65603-10.
Control of scientific work :
by Scientific officers of calibre of Fellows of the Royal Society, *Dobbs* (57) 65401, (110-3) 65470-4, 65475-6.
by University suggested, *Dobbs*, 65475-7.
CO-ORDINATION : (*See also* PROVINCIAL *below.*)
by Central Board of Agriculture necessary, *Sinha, D. P.* (199).
Inter-Provincial : Instance of lack of, *Dobbs*, 65435-6.
Recommended, *Roy, S. K.* (459).
McKerral's proposals, *Dobbs* (110-1).
of Scattered workers difficult, *Dobbs* (110).
Deputy Director's experiments, *Sethi*, 67569-80.
Extension necessary, *Ghose* (373-4).
Fertilisers, *see under that main heading.*

FINANCE :

should be Constant, *Dobbs* (52).
Imperial grants to Provinces for all-India research recommended, *Roy, S. K.* (459).
Insufficient, *Sethi* (349).
Fodder preservation experiments at Pusa, *Ganga Vishnu*, 65365-7.
Fruit growing, research as to, recommended, *Khan* (441).
Garden produce : inadequate, *Dobbs* (52).
Imperial Department : should deal with problems of all-India importance and quality crops, *Sethi* (349) (352) 67587-91.
Imperial Institute should co-ordinate provincial research, *Ganga Vishnu* (37).
Implements, research necessary, *Sinha, D. P.* (199).

INDIGENOUS METHODS :

in Education recommended, *Narendra* (407).
Improvement of, recommended, *Khan* (440-1).
Research recommended, *Sinha, D. P.* (199) 66526, *Sethi* (349), *Roy, S. K.* (456), *Roy, N. K.* (482).
Indigo, *Meyrick*, 68033-7.
Irrigation methods, research necessary, *Sinha, D. P.* (199).
Insect pests in the Mokameh Tal, research necessary, *Sinha, D. P.* (199).
Labour saving devices, research necessary, *Sinha, D. P.* (199).
Lines of research suggested, *Sethi* (349-50).

NUTRITIONAL :

on Cattle foods, recommended, *Roy, N. K.* (483).
Human suggested, *Dobbs* (67-8).
on Vegetable protein recommended, *Dobbs* (53).
Oil-seeds : research into transport difficulties would be valuable, *Dobbs* (53).
Organisation, improvement of, necessary, *Khan* (440).
Patna University : should be equipped to assist territorial officers, *Dobbs* (49) (52) 65373-5.

PROVINCIAL : (*See also* CO-ORDINATION *above.*)

Activities should be mainly propaganda and testing of results of central institutions, *Sinha, D. P.* (198) 66489-90.

RESEARCH—contd.

PROVINCIAL—*contd.*

as well as Central recommended, *Ghose* (374) 67677.
should deal with local problems, *Sethi* (349).
Staff, scientific, should be strengthened, *Sethi* (352) 67587-91.

PUSA RESEARCH INSTITUTE, *see under* **ADMINISTRATION.**

Records kept of failures as well as successes, *Dobbs*, 65603-7.
Recruitment: difficult to get men of proved ability, *Dobbs* (110-1).
Sabour Agricultural College, Research Section, still working, *Sinha D. P.*, 66523.
Scientific Commissioner suggested, *Dobbs* (50-1) 65376-8.
Soils, research necessary, *Sinha, D. P.* (199).

STAFF:

Increase recommended, *Ghose* (374).
Indianisation, efficiency should not be sacrificed to, *Ghose* (373-4).
Insufficient, *Sethi* (349) 67617-21, *Khan* (440).
Short-term contracts recommended, *Sethi* (352) 67592-4.

STATIONS: Inadequate, one in each Province required, *Ganga Vishnu* (37).

SUGARCANE: (*See also under* **CROPS AND CROP PROTECTION.**)

Bhoorli cane: has deteriorated, *Henry* (1).
Central bureau controlling experiments recommended, *Meyrick*, 68071.
Coimbatore canes replacing local Bhoorli, *Henry* (1-2) 64930-3.
Coimbatore Cane station: importance of work of, *Henry* (1).
Cutting: December to April, *Henry*, 64972-4.
Demonstration, *see under that main heading.*
Extension recommended, *Meyrick* (429) 68102-33.
Farm, experimental, near Pusa recommended, *Meyrick*, 68032, 68094-5, 68144-6.
Government experimental stations require more funds, *Meyrick* (429).
Publication of technical information recommended, *Meyrick*, 68072-3.
Pusa, *Meyrick*, 68085-9, 68144-6.

SUGAR BUREAU:

Cable service valuable, *Meyrick*, 68080-3.
Dobbs, 65406, 65661.
very Efficient, *Meyrick*, 68084.
Importance of work of, *Henry* (1).
Services, valuable, *Ganga Vishnu* (38) 65295-300.
Tenant class (kisans) have not benefited by, *Sinha, Arikshan* (257).
Tirhut Agricultural Museum at Muzaffarpur, *Arikshan Sinha* (258) (271).
University, all-India, proposed, *Dobbs* (111-2).
Vegetable protein, research as to digestibility recommended, *Dobbs* (53).
Veterinary, *see under that main heading.*
Waste heat, Second Law of Thermodynamics in relation to, *Dobbs* (53).

RICE, *see under* **CROPS AND CROP PROTECTION.**

RINDERPEST, *see under* **VETERINARY.**

ROADS, *see under* TRANSPORT *under* **ADMINISTRATION.**

ROPE-MAKING, *see under* **AGRICULTURAL INDUSTRIES.**

ROSS, Lt.-Colonel W. C., I.M.S., Director of Public Health, Bihar and Orissa (335-49) (*see* also **PHILLIPS,** witness).

CO-OPERATION: Credit societies: difficulties of (339).

EDUCATION:

English necessary for scientific training (339).
Primary, vast extension necessary (339).
Universities, too many (339).

FINANCE: Banks, vast extension necessary (339).

ROSS, W. C.—contd.

WELFARE OF RURAL POPULATION :

Baby Weeks, 67432-7.
Cholera :
very Prevalent, 67379.
Water infection, question of, 67379-80, 67495-9.
Death rate : decreased slightly, 67422.
Diet, 67450-4 (*See* Milk *below.*)
Diseases seriously affecting vitality (337).
Dispensaries :
Staff, 67493-4.
Numerous, 67409, 67421.
District boards and municipalities :
lack of Interest in child welfare, 67435-7.
Public Health Department inspect and advise, 67424-31
Economic importance of diseases and birth rate (337).
Health :
Agricultural improvement :
Finance, 67462-5.
Necessary (337-9).
An Economic problem (337-9).
Propaganda :
Baby Weeks, 67432-7.
Posters used, 67392-402.
Religious influence discussed, 67484-92.
Hookworm :
Two-thirds of population infected (337) 67379.
Vitality, etc., seriously affected by (337).
Hospitals, rural :
Co-operative, financial difficulty, 67413.
Cost, 67413-21.
very Few, 67408-12, 67493-4.
Inspector General of Civil Hospitals in charge, 67418-21.
Hygiene : Customs of the people, 67484-92.
Infant mortality reduced appreciably, 67423.
Legislative Council's favourable attitude to public health activities, 67444-5.
Malaria :
One-third infected (337).
Prevention :
Agricultural improvement recommended (338) 67404-7.
Ordinary methods inapplicable (338).
Vitality, etc., seriously affected by (337).
Medical Research :
Medical College, 67441-3.
Public Health Institute, 67446-50.
Medical School graduates do not practise in rural areas, 67466-9.
Medical staff, 67388-91.
Milk :
Control suggested, 67500-5.
Importance of, 67454.
Model villages, 67403.
Public Health Act :
England, example of, 67459-61, 67475-83.
Necessary, 67455-8.
Wells :
Apathy of the people, 67470-4.
Financial difficulty, 67380-7.
many Unfit, 67424-31.

ROTATION, *see under* **CULTIVATION.**

ROY, N. K., Assistant Registrar of Co-operative Societies, Ranchi Circle (482-504).

ADMINISTRATION :

Transport :
Communications in Chota Nagpur very good, 68374-6.

ROY, N. K.—contd.

ADMINISTRATION—*contd.*
Transport—*contd.*
Railways:
Coal, special facilities for, to prevent use of cowdung as fuel, recommended (487).
Fodder, flat rate for any distance within 500 miles suggested (488) (490).
Livestock, reduction of freights recommended (487).
Roads: Fodder, better transport facilities necessary (488) (490).

AGRICULTURAL DEPARTMENT: Co-operative movement does not receive much assistance from, 68368.

AGRICULTURAL INDUSTRIES:
Basket making, a caste occupation (491).
Co-operative organisation recommended (493) (495).
Health conditions, devotion of spare time to improving:
Boy scouts, organisation of, recommended (491).
Lectures recommended (491).
Industrial concerns, moving of, into rural areas, not desirable (491).
Jute spinning and weaving recommended (490-1).
Machinery:
Hire purchase system recommended (491).
Long-term loans for purchase of, at low interest recommended (491).
Obstacle: ignorance of methods (491).
Oil-pressing industry should be encouraged by loans under State Aid to Industries Act (488).
Poultry rearing, religious prejudice of Hindus (491).
Preparation of agricultural produce for consumption, industries connected with, Government encouragement recommended (491).
Schools to teach carpentry, furniture manufacture, rope making, etc., recommended (491).
Sericulture, a caste occupation (491).
Weaving, by hand, of cotton:
Finance: co-operative suggested (490).
Recommended (490).
Spinning mills for supplying yarn should be started by Government (490).
Teachers necessary (490).

ANIMAL HUSBANDRY:
Cattle breeding:
Co-operative, recommended (498).
Government farms should be increased (487).
Propaganda:
Co-operative, recommended (487-8).
Finance by Government and district boards (488).
Lectures, magic lantern, recommended (487-8).
Police should assist (488).
Shows recommended (488).
Railway freights on breeding stock should be reduced (487).
Stock should be distributed at reduced prices (487).
Dairying: model farms, mixed, Government aided, co-operative, recommended (488-90).
Fodder:
Crops, propaganda recommended (487-90).
Shortage from January to June (490).
Supply must be increased (488) (490).
Transport improvement necessary (488).
Oil-pressing industry should be encouraged by loans under State Aid to Industries Act (488).
Pastures:
Common:
Fencing recommended (489-90).
Overstocked (489).
Ploughing recommended (489-90).
Enclosed, absence of (489).

ROY, N. K.—contd.

ANIMAL HUSBANDRY—*contd.*

Root crops :
Encouragement by Government recommended (488).
Food tests recommended (488).
Silage recommended (489).

CO-OPERATION :

Adult education, movement must be a system of (492).
Agricultural Department, not much assistance from, 68368, 68385-99.
Agricultural improvement work recommended (483-4) (487-8) (493) 68382-91.
Arbitration recommended (493).
Boy scouts' organisation recommended (491) (497) (499).
Cattle breeding societies, encouragement by Government and district boards recommended (498).
Central Banks :
District Boards :
Connection with, necessary (496).
should Deposit funds with (497).
Good work of, 68366.
Supervision of primary societies necessary, 68366-7.
Credit :
Imperial Bank should lend to Provincial Bank at 3 per cent (498).
Interest : Reduction necessary (485) (498).
Long-term : Government financial assistance to Provincial Bank recommended (485) (498).
Multiplication of societies, as at present organised, not recommended (498).
Restriction of activities of societies to, deprecated (484-5).
Dairy, mixed, model farms recommended (488-9).
District Boards :
Assistance received from, 68369.
Connection with Central Banks necessary (496).
Contracts should be placed with co-operative societies (498).
Deposit of funds with Central Banks suggested (497).
Favoured-village policy recommended (498).
Education Department, no relationship with, 68369.
Education of members recommended (493).
Federation : subsidies from Government and district boards recommended (494-5) 68358, 68377-81, 68388-90, 68396-403.
Health work recommended (493) (495) 68370-3.
Honorary organisers : not satisfactory (495-6).
Irrigation, recommended (485).
Minorities, compulsion of, to join schemes for common improvement, recommended (498).
Municipalities should encourage co-operative societies (498).
Objects : should be mainly moral and educational (492-3).
Organisation too narrow (484-5) (491-9) 68364.
Organisers, paid, necessary (493-4) (496) 68357-65.
Primary societies :
Condition not satisfactory, 68354-6, 68364-5.
Supervision by Central Banks necessary, 68366-7, 68400-3.
Public Health Department, no organic connection with, 68370-3, 68393.
Schools, should establish (493) (495) 68369.
School teachers should be trained to assist the movement (497) (499).
Subsidiary industries recommended (493) (495).
Supervision inadequate, 68365-7.
Thrift should be taught (493).
Training : Institutions for training co-operative workers should be maintained by Government (493-4) 68357-63, 68368, 68371, 68377-81, 68388-90, 68396-403.
Welfare work in villages recommended (493).
Whole-village societies recommended (484-5) (491-9) 48357-8, 68382-4.

CROPS AND CROP PROTECTION :

Fodder crops, as part of a dairy and cattle breeding scheme, recommended (487-90).
New crops : marketing arrangements necessary (487).

ROY, N. K.—contd.

CROPS AND CROP PROTECTION—*contd.*

Root crops:
Encouragement by Government recommended (488).
Food tests recommended (488).
Seed distribution:
Co-operative godowns stocked by Government recommended (487).
Organisation necessary (487).
Wild animals, damage by: gun licenses should be more freely granted (487).

DEMONSTRATION AND PROPAGANDA:

Comparative demonstrations of improved and old methods recommended (483).
Co-operative:
Recommended (483-4) (493) 68382-99.
Subsidies from Government recommended (483-4).
Training of workers necessary (483-4).
on Cultivators' own fields, recommended (483-4).
Decorations (honours) for landowners taking an interest in animal husbandry, recommended (490).
Failure of demonstration in Kutey village (484).
Meetings of co-operative societies should be utilised (483).
Successful demonstration by Peloul Co-operative Society (484).

EDUCATION:

Attendance of boys in fourth class poor owing to inefficiency of teachers (499).
Boy Scouts' organisation recommended (491) (497) (499).
Compulsory, not recommended (499).
Co-operative assistance recommended (493) (495) 68369.
Propaganda necessary (499).
Schools should be village community centres (498-9).
Teachers:
Inefficient (499).
Pay inadequate (499).
Training to act as local organisers recommended (497) (499).

FERTILISERS:

Adulteration:
Co-operative distribution recommended (486).
Sealed bags recommended (486).
Artificial:
Rarely used (486).
Testing recommended (486).
Co-operative distribution:
in Ranchi Circle, 4 Central Banks agents for sale of sulphate of ammonia (486).
Recommended (486).
Subsidies, temporary, recommended (486).
Cowdung, use of, as fuel: tree plantation and transport facilities for coal recommended (486-7).
Demonstration recommended (486).

FINANCE:
Taccavi: not suitable (485).

FORESTS:

Deforestation in Chota Nagpur (491).
Rights, definition of, necessary (491).

IRRIGATION:

Bunds in Chota Nagpur recommended (485-6).
Co-operative societies for minor schemes recommended (485-6).
Extension, vast scope for (485).

ROY, N. K.—contd.

IRRIGATION—*contd.*

Obstacles: finance and lack of definite policy (486).
Reservoirs recommended (485).
Schemes suggested in Chota Nagpur (485).
Wells:
Scope for, unlimited (486).
Tube, research necessary (486).

RESEARCH:

Indigenous method, investigation of, recommended (482).
Nutritional, on cattle foods, recommended (483).

STATISTICS:

Census of livestock and implements:
Methods defective (499).
Time of taking should be the same as that of population census (499).

WELFARE OF RURAL POPULATION:

Health posters useless, 68372-3.
Surveys, economic, recommended (499).

ROY, S. K., M.A., Principal, Gossner High School, Ranchi (456-76).

ADMINISTRATION:

Meteorological Department: seasonal instead of annual basis suggested (459).
Transport: railway, freights should be reduced (459) (463).
Roads: Public Works Department should control more inter-district roads (459).
Steamers: freights should be reduced (459).

AGRICULTURAL DEPARTMENT:

Irrigation, special section recommended (462).
Staff: lower grades should be considerably increased (459).

AGRICULTURAL INDEBTEDNESS:

Causes of borrowing, unproductive expenses mainly (461).
Land mortgage banks recommended (461) (465).
Mortgages, non-terminable, should be prohibited (461).
Repayment prevented by: unproductive expenditure and small income (461).
Restrictions on credit of cultivators by limiting right of mortgage and sale deprecated (461) 68266-8, 68297-306.
Sources of credit: moneylenders and co-operative societies (461).
Usurious Loans Act recommended (461).

ANIMAL HUSBANDRY:

Co-operative assistance recommended (463).
Dairying: Model farms with poultry, recommended (463).

CAPITAL, ATTRACTING OF, TO AGRICULTURE:

Improvements hindered by law of resumption by superior landlord in the event of failure of heirs (469).

CO-OPERATION:

Audit: Government should control and pay for (466) 68265.
Bank, All-India Reserve or State, co-operative movement should be linked with (459-60) 68236-42, 68293-6.
Boy Scout movement (466).
Central Banks, criticism of finance policy, 68238-41.
Chota Nagpur, intensive co-operative development advocated (470).
Consolidation of holdings societies recommended (462).

ROY, S. K.—contd.

CO-OPERATION—*contd.*

Credit Societies: short-term recommended (460-1).
District boards, connection with movement (466).
Education, as to credit, necessary (460) (465) 68240.
Fertilisers, distribution of, recommended (462).
Government policy suggested (465-6) 68249-50, 68286-8.
Improvements:
Large, finance by land mortgage banks (465).
Minor, by individuals with co-operative assistance (465).
Interest: Reduction to 9¾ per cent to cultivators by means of loans from all-India bank at 4 per cent to provincial co-operative banks, suggested (460).
Joint farming, with limited liability and Government financial help, recommended (458) (464-5).
Marketing organisation recommended (464) 68249-50, 68255-60.
Minorities, compulsion of, to come into schemes for joint improvement, recommended (466).
Non-officials, importance of (466) 68281-8.
Objects achieved only as loans institutions (466).
Propaganda, idealistic, necessary, 68281-8.
School teachers, assistance of (466) (468).
Seed distribution recommended (463).
Training of officials, etc., by Government recommended (466).

CHOTA NAGPUR: Intensive development advocated (470).

CROPS AND CROP PROTECTION: Seed distribution: co-operative recommended (463).

DEMONSTRATION AND PROPAGANDA:

Adult education, should be conterminous with (458).
Co-operative, recommended (458-9).
Field comparative demonstrations recommended (458).
Sugarcane successfully demonstrated (459).

EDUCATION:

Agricultural:
Agricultural classes, small proportion drawn from (457).
no College (457); revival of, recommended, 68234-5.
Demand greater than supply (457).
Extension advocated (457).
Importance of (467-8).
Incentive, Government employment (457).
Institutions insufficient (457).
in Middle schools recommended (468).
Practical recommended (468).
no Schools (457).
Teachers: Supply insufficient (457).
University, faculty of agriculture recommended (457) (468) 68234-5.
Vocational teaching, only provision for, is the taking of apprentices at Government demonstration farms (457).
Attendance in upper class of schools poor: reasons (469) 68269-75.
Compulsory:
Recommended (469) 68251-4.
of Zamindars recommended, 68251-4.
Co-operative assistance recommended (469).
Middle class youths, attracting of, to agriculture:
is the Central agricultural problem in India (457).
Co-operative limited liability farming with Government financial help recommended (458) (464-5).
Demonstration that agriculture can be profitable, recommended (458).
Desire for agricultural life (457).
Land Acquisition Act necessary (458).
Towns drain the villages (457).
Nature study as a compulsory subject, recommended (469).

ROY, S. K.—contd.

EDUCATION—*contd.*

Project method recommended (468).
School boards, district, recommended (469).
School plots essential (469).

Teachers :
Negligence and dishonesty of (469).
Training schools, intimate touch with village schools recommended (468).
Village life, should play an important part in (468).

FERTILISERS :

Adulteration : co-operative distribution recommended (462).
Cowdung, use of, as fuel : tree plantation, use of leaves as fuel, and coal supply, recommended (463).
Demonstration as to resulting profits necessary (462-3).
Increased use in area covered by Khunti Central Bank (463).
Leaves (463).
Natural : conservation, importance of (462).
Research inadequate (463).

FINANCE :

Banking system only finances traders and capitalists (460).
Currency notes recommended (460).
Importance of (459-60).
Land mortgage banks recommended (461) (465).

FORESTS :

Deforestation in Chota Nagpur (463).
Rights, definition of, necessary (463).

HOLDINGS : consolidation : co-operative societies recommended (462).

IRRIGATION :

Agricultural Department, special irrigation section recommended (462).
Bunds in Chota Nagpur :
Advocated (462) 68243-8, 68289-90.
Successful, examples of (462) 68243-8.

AND TENURE :

Landlords : absentee (457).
Resumption by superior landlords in the event of failure of heirs, hinders improvement of land (469).

MARKETING :

Federation of village co-operative societies :
Finance (464) 68255-60.
State control discussed (464) 68249-50.
Suggested (464).
Prices, stabilisation of (463-4).

RESEARCH :

Board of scientific advice and research recommended (459).
Chemical research recommended (456-7) 68291-2.
Finance : Imperial grants to Provinces for all-India research recommended (459).
Indigenous theory, research urgently required (456).
Inter-provincial co-ordination advocated (459).

STATISTICS : Central Co-operative Banks' staff should carry out with Government subsidies (469).

VETERINARY : Department : lower grades should be considerably increased (459).

ROY, S. K.—concld.

WELFARE OF RURAL POPULATION: Surveys, economic, with assistance of Central Co-operative Banks, recommended (469).

SABOUR AGRICULTURAL COLLEGE, *see under* EDUCATION.

SABOUR FARM, *see under* EDUCATION.

SALE, *see* MARKETING.

SANITARY CONDITIONS, *see under* WELFARE OF RURAL POPULATION.

SARUP, Rai Bahadur Bishun, Secretary to the Government of Bihar and Orissa, Irrigation Department (309-10).
(*See also* BERY, witness).

IRRIGATION:

Distribution:
in Bihar satisfactory (310).
in Orissa, great wastage (310).
Persian wheels suggested (310).
Schemes, scope for small (309-10).
Tanks in Bihar (310).
Wastage (310).
Wells (310).

SEED, *see under* CROPS AND CROP PROTECTION.

SERICULTURE, *see under* AGRICULTURAL INDUSTRIES.

SETHI, D. R., M.A., B.Sc. (Edin.), I.A.S., Deputy Director of Agriculture, Orissa Range (349-73).
Duties, 67569-80.
Experience, 67547-8, 67620-1.

ADMINISTRATION:

Posts and Telegraphs: marketing information should be exhibited to cultivators at offices (352-3) 67517-8.

Transport: Communications, lack of, hampers marketing (352).

AGRICULTURAL DEPARTMENT:

Co-operative societies, close touch with, in Orissa, 67605.
Deputy Director, duties of, 67569-80.
Economic Botanist should be replaced by plant breeding specialist (356).
Expansion urgently necessary (349).
Staff:
Insufficient (349) (355-6) 67603-4, 67617-21.
Training (350) 67538-44, 67574-8, 67628-9.
Visits to Pusa and other Provinces recommended (352) 67514-6.

AGRICULTURAL INDEBTEDNESS:

Causes of borrowing: Thriftlessness, illiteracy, crop failures, uneconomic size of holdings, decay of cottage industries, loss of cattle, laziness (353).
Measures for lightening agriculture's burden of debt: Education (353).
Moneylenders:
Exorbitant interest and inhuman conditions (353) 67524.
Sale, compulsory, of produce, to moneylenders at low prices (360).
Mortgages: facilities for redemption, of doubtful benefit (353).
Repayment prevented by: Thriftlessness, unproductive expenditure, exorbitant interest (353).
Source of credit: mainly moneylenders (353).
Usurious Loans Act, of doubtful benefit (353).

SETHI, D. R.—contd.

AGRICULTURAL INDUSTRIES :

Co-operation recommended (359).
Cottage industries to decrease fragmentation of holdings, recommended (353).
Demonstration recommended (359).
Fruit growing recommended (359).
Gur-making recommended (360).
Implements, made by village carpenter, 67637-8.
Importance of (359).
Industries Department should assist (359).
Leisure period of cultivators (359).
Obstacles : laziness, ignorance, prejudice (359).
Oil-pressing recommended (360).
Pisciculture recommended (359) 67507-8.
Population, pressure of, subsidiary occupations necessary to relieve (353) (359) 67633-8.
Poultry rearing recommended (358-9).
Preparation of agricultural produce for consumption, industries connected with recommended (360).
Rice hulling recommended (360) 67634-5.
Sericulture recommended (359-60).
Spinning recommended (359-60) 67633-8.
Weaving recommended (359).

AGRICULTURAL LABOUR :

Migration in the slack season to Calcutta, Jamshedpur, etc. (359).
Population, agricultural, slowly but steadily increasing (359).

ANIMAL HUSBANDRY :

Bulls, stud :
  Brahmini, of no use (358) 67648-50.
  at Village farms recommended (358).
Cattle :
  Condition in Orissa appalling (357).
  Uneconomic : reduction recommended (359) 67545-6, 67651.
Cattle breeding :
  Dual purpose recommended (358) 67606.
  Herds kept (358).
Dairying :
  Co-operative, recommended (358).
  Middle class youths should be encouraged to take up (358).
  Model farms recommended (358) 67622-6.
Fodder :
  Crops recommended (356) (358-9).
  Rice dust as cattle food (358).
  Rice straw :
    Reservation for cattle recommended (359).
    used for Thatching purposes (358-9).
  Shortage from January to June (359).
Fodder crops recommended (356) (358-9) 67607-8.
Goats recommended (358).
Landlords :
  Encouragement to take interest, necessary (359).
  have done Nothing to improve (359) 67526-8, 67654-6.
Pastures :
  Co-operative societies recommended (358).
  Fees should be charged (358).
  Shortage of (358).
Pinjrapoles, 67566-8.
Propaganda recommended (357-8) 67651-6.
Sheep (358).
Silage (358-9).
Stall-feeding (358-60) 67609-11.

SETHI, D. R.—contd.

CO-OPERATION :

Agricultural Department, close touch with, in Orissa, 67605.
Central Banks : merely cheap moneylenders (360-1) 67523-5, 67529 32.
Consolidation of holdings societies recommended (353).
Credit societies :
Loans :
insufficiently Controlled (360) 67611-6.
for Manure should not be in cash but in kind (355) 67519-25.
Main co-operative activity (360).
Objects not achieved in Orissa (361).
Dairies recommended (358).
Demonstration of improved agricultural methods recommended (351) 67563.
Fencing recommended (356) 67643.
Grain golas (360).
Implements, societies for purchase, sale and hire, recommended (357).
Irrigation societies recommended (354).
Livestock societes recommended (358).
Members, education of, neglected, 67611-6.
Minorities, compulsion of, to come into schemes for joint improvement, recommended (361).
Non-credit Societies :
Recommended (360-1).
not generally Successful in the past (360).
Non-officials :
Importance of (360).
Landlords should help (360).
Objects not achieved (361) 67611-6.
Pasture societies recommended (358).
Sale societies recommended (358) (360).
Staff of Department should be increased (360).
Subsidiary industries, societies recommended (359).

CROPS AND CROP PROTECTION :

Cattle, straying :
Damage to crops serious (356) 67643.
Fencing, co-operative, recommended (356) 67643.
Fodder crops recommended (356) (358-9) 67607-8.
Groundnut, large scope for extension (356-7).
Maize under irrigation on early paddy lands recommended (357).
Rice :
Improvement of (67581-2).
the Main crop in Orissa (357).
Seed distribution :
Free, for demonstration, recommended (356).
Methods, 67583-6.
Middle class youths should be encouraged to take to farming (356).
Village farms recommended (356).
Work done, 67564-5.
Successful efforts in improving crops (357).
Sugarcane :
Coimbatore, 213, successful, 67553-62, 67581.
large Scope for extension (356-7).
Wild animals, damage by :
Imperial research recommended (356-7).
near Jungles (356).

CULTIVATION :

Rice :
Broadcast (357).
Hand weeding (357).
Improvement, 67581-2.
the Main crop in Orissa (357).
Second crop not usually taken (357).

SETHI, D. R.—contd.

CULTIVATION—*contd.*
Rotation :
Demonstration recommended (357).
None in Orissa (357).

DEMONSTRATION AND PROPAGANDA :
Co-operative assistance recommended (351) 67563.
Court of Wards estates should be used for demonstration (351).
on Cultivators own fields recommended (351-2) 67563.
Farms :
Control by Agricultural Department assisted by private agencies and co-operative societies (351).
Cultivator demonstrators should be in charge (351).
should Distribute seeds, manures, implements, etc. (351).
in each important Village, suggested (351) 67630-2.
Fodder crops, demonstration of, recommended (356).
Landowners should assist (351).
Staff insufficient, 67603-4.
Successful demonstrations (352) 67581-2.

EDUCATION :
Adult : practical agricultural demonstration recommended (351).
Agricultural :
After-careers, of students :
Farming, none (350).
Government service usually (350).
College, provincial : revival of :
Affiliation to University necessary, 67543-4.
Required (350) 67536-44, 67549-52.
Veterinary college, should be linked with, 67549.
Incentive, hope of obtaining Government employment (350).
in Middle rural vernacular schools, recommended (350).
Pupils, rarely from cultivating classes (350).
Elementary : urgently needed (350).
Middle class youths, attracting of, to agriculture :
improving Village life, educational institutions, model farms, land, financial help and advice (350-1) (356) (358) 67510-3, 67533-5, 67622-7.
Nature study, school farms and school plots, recommended (350) 67509.
Teachers : agricultural classes, should be drawn from (350).

FORESTS : Village plantations recommended (355).

FERTILISERS :
Adulteration :
Analysis, facilities for, necessary (355).
Guarantee recommended (355).
Legal penalties recommended (355).
Artificial : price difficulty (355).
Cowdung, use of, as fuel :
causes Shortage for manure (355).
Village tree plantations recommended (355).
Demonstration recommended (355) (360).
Distribution, co-operative, free, recommended (355).
Export of bones, oilcakes and fish refuse, should be stopped (355).
Green manuring, 67581-2.
Lime deficiency (359).
Nitrogen :
Deficiency (354-5).
Fertilisers :
Increased use (355) 67600-2.
Price, decrease in, (355).
Phosphate deficiency (354-5) (359) 67639-42.
Research : insufficient (355).
Sulphate of ammonia, used for sugarcane and potatoes (352) 67553-60, 67600-2.
Taccavi for purchase of manures recommended (360).

SETHI, D. R.—contd.

FINANCE :

Importance of (353).
Taccavi :
not of material Benefit (353).
for Drainage of land recommended (354).
for Manures recommended (360).
Unpopular (353).

HOLDINGS :

Consolidation prevented by ignorance (354).
Co-operative consolidation of holdings societies recommended (353).
Cottage industries to relieve pressure on land recommended (353).
Fragmentation :
Education recommended (353-4).
Legislation not recommended (354).

IMPLEMENTS :

Co-operative societies recommended (357).
Demonstration on village farms recommended (357).
Engineering Section of Agricultural Department, should take up improvement (357) 67644.
Instalment system recommended (357).
Mass production by private enterprise recommended, 67644-7.
Ploughs :
Improvement, importance of (357).
Inefficient country plough used (357).
Punjab iron plough used, 67645.
Price difficulty (357) 67644-7.

IRRIGATION :

Co-operative irrigation societies recommended (354).
Extension, importance of (354).
Lift : iron *rahat* wheel, etc., recommended (354) (357).
Rainfall, average 60 ins. but not well distributed (354).
Tanks and bunds in Orissa silted up and brought under cultivation (354).

LAND TENURE :

Landlords :
Absentee, 67528.
take no Interest in agriculture (359) 65526-7, 67654-6.

MARKETING :

Communications, lack of, hampers marketing (352).
Co-operative sale societies recommended (358) (360).
Facilities : not satisfactory (360).
Information as to prices should be exhibited at post offices (352-3) 67517-8.
Moneylenders, sale of produce to, at low prices (360).

RESEARCH :

Deputy Director's experiments, 67569-80.
Finance : funds insufficient (349).
Imperial Department : should deal with problems of all-India importance and quality crops (349) (352) 67587-91.
Indigenous theory should be studied (349).
Lines of research suggested (349-50).
Provincial :
Investigation of problems recommended (349).
Staff, scientific, should be strengthened (352) 67587-91.
Staff :
Insufficient (349) 67617-21.
Short-term contracts recommended (352) 67592-4.

SETHI, D. R.—concld.

Soils :

Drainage :
Agricultural Engineer's staff should be increased (354).
Demonstration (354).
Loans, taccavi, and under Land Improvement Act, recommended (354).
Survey, necessary (354) 67595-9.

Veterinary :

Inoculation, serum-simultaneous :
Recommended, 67545-6.
of Uneconomic cattle, not recommended, 67545-6.

Welfare of Rural Population :

Malaria : pisciculture recommended, 67507-8.
Population, increasing pressure on the land (359).

SHEEP, *see under* ANIMAL HUSBANDRY.

SILAGE, *see under* ANIMAL HUSBANDRY.

SILT, *see under* SOILS.

SILTING, *see under* IRRIGATION.

SINHA, ARIKSHAN, Pleader, General Secretary, Bihar Provincial Kisan Sabha, Muzaffarpur (256-77).

Administration :

Court fees, etc., increase of, deprecated (272).
Government policy criticised (256-7) (272-3) 66822.
Posts and Telegraphs : increased cost deprecated (272).
Taxation of poor people excessive (272).
Transport :
Railways :
Distance from station, difficulty of (270).
Perishable produce, prompt dispatch necessary (260-1).
not Satisfactory (260-1).

Agricultural Department :

Co-operative Department, co-operation with, suggested (271).
Extension recommended (260).
Services : do not benefit cultivators (260).

Agricultural Indebtedness :

Causes of borrowing : need of capital, maintenance of family, and ceremonies (261).
Mortgage right should be conferred on tenants (261).
Repayment prevented by : crop failure and reduced productive capacity of soil (261).
Restriction or control of credit of cultivators not recommended (261).
Sources of credit : agricultural produce, land and cattle (261).
Transfer right should be conferred on tenants (261).
Usurious Loans Act :
strict Application recommended (261).
Interest reduction by co-operative societies should precede application of Act (261).

Agricultural Industries :

Cardboard, utilisation of wheat straw for, will cause scarcity of fodder (268).
Employment can only be increased by industrialism (268).
Fruit growing is carried on (268).
Health conditions, devotion of spare time to improving of : village societies recommended (268).

SINHA, ARIKSHAN—concld.

AGRICULTURAL INDUSTRIES—*concld.*

Industrial concerns, moving of, to rural areas :
Shortage of agricultural labour would result (268).
Leisure period : cultivators work 200 days in the year (268).
Obstacles : conservatism of cultivators (268).
Paper, utilisation of rice straw for, will cause scarcity of fodder (268).
Study, intensive, not necessary (268).

AGRICULTURAL LABOUR :

Attracting of, higher wages discussed (268-9).
Forced labour (268-9).
Manual labour, prejudice against (268-9) 66863-6.
Shortage, existence of (268-9).
Wages (268-9).

ANIMAL HUSBANDRY :

Bulls :
Brahmini : (267) 66817-9.
District boards should maintain (267).
Free use recommended (267).
Cattle : heavy decrease in number (264-5).
Fodder :
Green :
Absence of from March to June (267).
Supply, July to September (267).
Makai (267).
Shortage of (265) (268).
Wheat and barley straw best (267).
Grazing grounds : shortage of (264-5).
Pastures :
Common :
Extension recommended (267) 66843-4.
Overstocked (264-5) (267).
Legislation necessary (268).

CAPITAL, ATTRACTING OF, TO AGRICULTURE :

Capitalist land monopoly, danger of (262) (271-2) 66840.
Facilities for capitalist acquisition of land necessary (271).
Improvements, factors discouraging (272).

CO-OPERATION :

Agricultural Department, co-operation with, suggested (271).
Cattle breeding societies not feasible (271).
Consolidation of holdings societies recommended (271).
Credit societies : working well (270).
Demonstration of improved agricultural methods, no provision for (270).
Drainage recommended (271).
Fertilisers, distribution of, recommended (265) (270-1).
Finance, large advances from Government recommended (270).
Implements, hiring, recommended (266) (271).
Improvements, societies for effecting, recommended (270-1).
Interest :
Excessive (261) (270).
Reduction to 12 per cent or 9 per cent per annum recommended (261) (270).
Joint farming societies not feasible (271).
Minorities, compulsion of, to come into schemes for joint improvement, strongly recommended (271).
Objects : only partly achieved (271).
Seed distribution recommended (266) (270).
Tirhut Agricultural Association, a failure (258) (271).

SINHA, ARIKSHAN—contd.

CROPS AND CROP PROTECTION :

Expert advice necessary (266).
Fodder :
Crops recommended (269-70).
Janera grown (265-6).
Fuel : *rahar*, cotton and castor recommended (269-70).
Output has decreased (258-9) 66820-1, 66823-4.
Profitable crops (266).
Seed distribution :
Co-operative, recommended (266).
on Credit, suggested (258).
Necessary (258).
Sugarcane : capital required for (266) 66804-5.
Varieties cultivated (265-6).
Wheat, Pusa, a failure (258) (260) (266) 66832-3.
Wild animals, damage by :
Afforestation near villages will increase (270).
Importance of (266).

DEMONSTRATION AND PROPAGANDA :

Agricultural Association at Muzaffarpur, failed (258) (260) 66825-6.
Agricultural associations, sub-divisional, recommended (258).
Demonstrators, experts, in each sub-division recommended (258).
Fertilisers, demonstration necessary (260).
Field demonstration recommended (259-60).
Lectures recommended (260).
Local demonstration necessary (258).
Non-co-operation movement, effect of (260).

EDUCATION :

Agricultural :
Institutions, lack of (259).
in Primary and middle schools recommended (271).
Schools required in every sub-division (259).
Teachers should be drawn from agricultural classes (259).
Compulsory primary education advocated (271).
Fourth class, small proportion of boys in, due to want of compulsion (271).
Methods, useless for agriculture or trade (277).
Sabour Agricultural College : Agriculturists had no faith in (259).
School farms recommended (271).

FERTILISERS :

Artificial : not used in Muzaffarpur area (265).
Ash (wood) :
used as Fertiliser (265).
Shortage of (265).
Cattle, decrease of, has reduced supply of dung (264-5).
Co-operative supply recommended (265).
Cowdung :
Scarcity of (264-5).
Use of, as fuel, due to scarcity of alternative fuels (265).
Distribution on credit recommended (265).
Expert advice necessary (265).
Soils : some requiring manures and others not (263).

FINANCE :

Taccavi :
Co-operative distribution recommended (261).
Extension recommended (261).

SINHA, ARIKSHAN—contd.

FORESTS :

Afforestation :
Legislation necessary to encourage (265).
in Villages, no opening for schemes (270).
Bamboos : Planting recommended (265).
Firewood, shortage caused by land tenure system (265) (269).
Grazing :
Deterioration of forests not being caused by (270).
Facilities inadequate (269).
Landlords, obstruction by (269).
Shisham trees : Planting recommended (265).

HOLDINGS :

Co-operative consolidation societies recommended (271).
Fragmentation :
Bad results of (261-2) (271).
Legislation necessary (262).
Legislation to deal with widows, minors, etc., recommended (262).

IMPLEMENTS :

Co-operative hiring out of ploughing machinery recommended (266) (271).
Ploughs :
Country types generally used (266).
Meston, not found satisfactory (266).

IRRIGATION :

Bunds (264) (270).
Drainage, importance of (263) (266).
Flood, protective schemes recommended (262) (270).
Landlords, obstruction by (262-3).
Legislation recommended (262-3).
Saligrami bund from Bettiah to Hajipur, should be cut (264) 66834-9.

KISAN SABHA, 66846-54, 66859-62.

LAND TENURE :

Capitalist land monopoly, danger of (262) (271-2) 66840-2.
Firewood scarcity caused by law as to ownership of trees (265).
Price of land has increased, 66823.
Rent is increasing, 66823.

MARKETING :

Fruits : railways, difficulty of distance from (270).
Information being placed at disposal of cultivators, etc., recommended (270).
Village markets :
as to Food crops and vegetables satisfactory (270).
as to Money crops, difficulties (270).

RESEARCH :

Fertilisers, experiments necessary (260).
Pusa Research Institute : a waste of public money (257-8) (264) (267) 66803-16, 66855-8.
Tenant class (kisans) have not benefited by (257).
Tirhut Agricultural Museum at Muzaffarpur (258) (271).

SOILS :

Alkali lands :
Expert advice necessary (264).
Flooding found successful (264).

SINHA, ARIKSHAN—contd.

SOILS—*contd.*

Classification (263).
Erosion : bunds recommended (270).
Reclamation :
Expert advice necessary (264).
Grants-in-aid recommended (264).
Loans without interest suggested (264).
Silt :
Bagmati River water beneficial (264).
sometimes Beneficial but sometimes injurious (264).
Gandak River water North of Muzaffarpur injurious (264).

STATISTICS : extension recommended (272).

TARIFFS AND SEA FREIGHTS : reduction of custom duties and sea freights on agricultural produce recommended (270).

VETERINARY :

Contagious diseases :
no proper Arrangements for dealing with (267).
Legislation recommended (267).
Department of no benefit to cultivators (260) 66813-6.
Dispensaries :
Expansion inadequate (266).
Inadequate, 66814-6.
Provincial control recommended (266).
Research :
Necessary (267).
Provincial institution and officers advocated (267).
Superior Veterinary Officer with the Government of India unnecessary (267).

WELFARE OF RURAL POPULATION :

Expenditure, increase advocated (272).
Policy of Government criticised (256-7) (272-3) 66822.
Surveys, economic : Recommended (272).

SINHA, DEVAKI PRASAD, M.A., M.L.C., Patna (197-216).

ADMINISTRATION :

Boards of Agriculture :
Central :
for Co-ordination (198-9).
Finance : tax on agricultural exports recommended (199) 66527-30.
Higher appointments should be controlled by (202) 66491.
Provincial : reorganisation recommended (199).
Provincial Development Board recommended (208) 66486-8.
Pusa, post-graduate study at, recommended (200).
Transport :
Bridges, lack of (202).
Cowdung, use of as fuel : coal should be substituted by means of improved transport (204).
Employment, rural, might be increased by improved transport facilities (206).
Roads, lack of :
Agricultural development hampered by (202).
Marketing hampered by (202).
Subsidiary industries : transport difficulty (206).

AGRICULTURAL DEPARTMENT :

Expenditure, inelasticity of rules (198) (202) 66486-8.
Province, limitation of appointments to, deprecated (202) 66491-3.
Red tape : (198) (202) 66486-8.
Services : not sufficiently useful (202).

SINHA, DEVAKI PRASAD—contd.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : inadequate incomes, rent demanded in advance, litigation, ceremonies, large families, social aspirations, uncertainty of agriculture, old debts (203).
Insolvency, special measures to deal with, not necessary (204).
Interest : Disallowance by law over 12 per cent recommended (203-4) 66533-4.
Measures for lightening agriculture's burden of debt :
Agricultural banks (204).
Interest restriction to 12 per cent (204).
Moneylenders : (204).
Mortgages :
Limitation to some extent recommended (204).
Redemption, special measures to facilitate, not necessary (204).
Repayment prevented by ; high interest, and unwillingness (203).
Restriction or control of credit of cultivators not recommended (204) (*see* Mortgages *above*).
Sources of credit (203).
Usurious Loans Act, application strongly recommended (204) 66533-4.

AGRICULTURAL INDUSTRIES :

Blacksmiths (205).
Co-operative societies recommended (206).
Domestic service in towns (205).
Employment, rural could be increased by :
Market organisation (206).
Transport facilities (206).
Government aid suggested (206).
Health conditions, devotion of spare time to :
Clubs, rural, recommended (206).
Gymnasia recommended (206).
House repairing (205).
Industrial concerns, moving of, to rural areas :
Catechu and Shellac industries might be moved to rural areas (206).
Markets, distance from, difficulties of (206).
Transport difficulties (206).
Jungle products, sale of (205).
Leisure period : cultivators generally busy for 6 or 8 months interspersed with days of idleness (205).
Matches, manufacture of : Government aid suggested (206).
Mining work (205).
Obstacles :
Conservative habits (206).
Market, lack of (206).
Transport difficulty (206).
Railway work (205).
Slack season, method of spending (205).
Splints, manufacture of : Government aid suggested (206).
Standard of life, improvement necessary (206) 66502-3.
Study, intensive, not necessary (206).
Weaving by *jolahas* (205).

AGRICULTURAL LABOUR :

Attraction of :
very Difficult (206).
labour Unions recommended (206).
Cultivation of unoccupied land :
very Difficult (206).
labour Unions recommended (206).
Supply :
Organisation necessary (206).
Spasmodic (206).

SINHA, D. P.—contd.

ANIMAL HUSBANDRY :

Cattle : miserable condition of (205).
Dairying :
Co-operative, recommended (205).
Farms, recommended (205).
Government aid suggested (206).
Fodder :
Insufficient (205).
Shortage greatest in April, May and June (205).
Silage-making by co-operative societies recommended (205).
Improvement :
by District boards and influential villagers, necessary (205).
Landowners, cannot be induced to take interest in, unless forced by law (205).
Pastures, common :
Legislation necessary (205).
Overstocked (205).

CAPITAL, ATTRACTING OF, TO AGRICULTURE :

Advertisement recommended (208).
Facilities, special, recommended (208).
Improvements of land discouraged by :
Ignorance of cheap methods (208).
Land tenure system (208).

CO-OPERATION :

Banking : not successfully managed (203) 66494-6.
Bhadralogo class alone benefited (207).
Cattle breeding societies :
Popularisation recommended (207).
very Rare (207).
Cheque, use of, should be encouraged (207).
Consolidation of holdings societies :
Popularisation recommended (207).
very Rare (207).
Credit Societies :
Banks, in place of, recommended (203) 66494-6.
Business morality of members, importance of (207).
Loans :
Cheque payment recommended (207).
Use of, importance of (207).
the most Popular (207).
Dairy farms recommended (205) (207).
Department : activities diffused (203).
Fertilisers : sale depots recommended (204).
Hospitals suggested (207) 66506-7.
Implements : hiring to members and non-members recommended (205).
Markets recommended (207).
Minorities, compulsion of, to come into schemes for joint improvement, recommended (207).
Objects : not much achieved (207).
Poorest class should be included (207).
Purchase societies : extension recommended (207).
Sale societies : extension recommended (207).
Silos recommended (205).
Societies for improvement, joint farming and machinery utilisation :
Recommended (207).
Very rare (207).
Subsidiary industries, societies recommended (206).

CROPS AND CROP PROTECTION :

Pests : Insects in Mokameh Tal, research necessary (199).

SINHA, D. P.—contd.

DEMONSTRATION AND PROPAGANDA:

Charts may be of use (202).
Cinema recommended (202).
Cultivators' confidence destroyed by unsuccessful demonstration (197-8).
on Cultivator's own fields recommended (201-2).
Exhibitions recommended (202).
Fairs, propaganda at, unsuccessful (202).
Farms of doubtful utility (201).
Groundnut: successfully demonstrated (202).
Leaflets of little use owing to illiteracy (202).
Meetings recommended (202).
Personnel, importance of (202).
Posters may be of use (202).
Rice:
Dahia and Indrasail varieties successfully demonstrated (202).
Wheat: Pusa 12 successfully demonstrated (202).

EDUCATION:

Adult: Evening schools:
recommended; district boards should manage (201).
Agricultural:
Bias recommended (199) (207).
College not recommended (200).
Field excursions recommended (199).
Government recognition necessary (207).
Incentive, service in Agricultural Department (200).
Institutions not popular (201).
Post-graduate study at Pusa, America or Denmark recommended (200).
Schools, costly and unpopular (199).
Colleges, agriculture should be taught as a science subject (200) 66525.
Compulsory primary education:
Financial difficulty, 66546-50.
Necessary (208).
Public opinion, 66644-50.
Demonstrators of Agricultural Department should be trained at provincial farms (200)
Farms, provincial, should undertake agricultural education (200).
Fourth class, small proportion of boys in, due to early marriage and necessity of earning a livelihood (208).
Kamdars should be educated for demonstration at provincial farms (200).
Middle class youths, attracting of, to agriculture:
Preference should be given to agricultural students for executive positions (200-1) 66519.
Officers, executive, should be educated in agriculture (200-1).
Population, excessive growth of, would be checked by education, 66508-10.
Primary schools, agriculture should be taught in (199).
Results of: makes agriculture a discredited profession (207).
Sabour Agricultural College:
Closed by recommendation of Agricultural Committee (198) 66520-5.
Re-establishment not recommended, 66525.
Research section still working, 66523.
School farms:
in Primary schools unnecessary (199).
in Secondary schools recommended (199).
School plots, in primary schools, unnecessary (199).
Secondary schools, agriculture should be an optional subject (200).
St. John's Ambulance Association: methods of education recommended as an example (200).
Universities, faculties of agriculture recommended (200) 66525.
Zamindars, etc., should attend short-period courses at provincial farms (200).

FERTILISERS:

Co-operative sale depôts recommended (204).
Cowdung, use of, as fuel:
coal, substitution of, should be facilitated by improved transport (204) 66540-3.

SINHA, D. P.—contd.

FERTILISERS—*contd.*
Literature should be distributed (204).
Markets, village, should be utilised to popularise new fertilisers (204).
Popularisation of new fertilisers through schools, post offices, markets and demonstrators recommended (204).

FINANCE:

Banks, agricultural:
in Place of of co-operative societies, 66494-6.
Recommended (203-4) 66494-6.
Taccavi: does not think much of (203).

FORESTS:

Afforestation:
Plenty of openings for in Chota Nagpur (206).
Waste lands should be afforested (206).
Firewood: Lopping not allowed in reserve forests, 66542.
Floods: opening of passages through railways recommended (206).
Fodder: waste land should be cultivated (206).
Grazing: forests not suffering deterioration from (206).
Guards: corruption (206).
Management: local control suggested (206).
Reservation:
methods, criticism of (206) 66504-5.
Unpopular (206) 66504-5, 66542.

HOLDINGS: Fragmentation: Inevitable (204) 66497-501, 66535-6.

IMPLEMENTS:

Hire-purchase system recommended (205).
Hiring of costly implements from co-operative societies recommended (205).
Price difficulty (204).
Research necessary (199).

IRRIGATION:

Control of, by zamindars leads to oppression of the poor (204) 66537-40.
Laws: Minor and Private Irrigation Works Acts of 1922, no work carried out under (204).
Legislation necessary to bring irrigation under public control (204).
Research as to easy methods necessary (199).

LAND TENURE:

Bengal Tenancy Act, 66518, 66531.
Cesses, illegal, imposed by landlords (203) 66514-8.
Government's policy criticised (197) 66514-8.
Improvement of land discouraged by present system (208) 66531.
Landlords:
Lack of interest (205).
Oppression of tenants (203) 66517, 66537-40.

MARKETING:

Co-operative markets recommended (206-7).
Employment, rural, could be increased by organisation of markets (206).
Exporters: wide activities of (206).
Information:
Government should distribute gratis (207).
Ignorance of cultivators of price variations (207).

SINHA, D. P.—contd.

MARKETING—*contd.*

Markets: no Lack of (206).
Roads, absence of, compelling dependence upon middlemen (202).

RESEARCH:

Central:
Chief institutions should be (198).
Fundamental research (198) 66489-90.
Co-ordination by Central Board of agriculture necessary (199).
Implements, research necessary (199).
Indigenous theory: research recommended (199) 66526.
Irrigation methods, research necessary (199).
Insect pests in the Mokameh Tal, research necessary (199).
Labour saving devices, research necessary (199).
Provincial: activities should be mainly propaganda and testing of results of central institutions (198) 66489-90.
Soils, research necessary (199).

SOILS:

Analysis, facilities for, necessary (199).
Research necessary (199).

STATISTICS:

Committee appointed by Government of India two years ago; recommendations disregarded (208).
Importance of (208).
Progress: very little (208).

TARIFFS AND SEA FREIGHTS:

Exports, agricultural, small tax to finance Central Board of Agriculture suggested (199) 66527-30.
Protection would adversely affect cultivators (197) (207) 66527-30.

VETERINARY:

Contagious diseases:
Legislation useless (205).
Propaganda recommended (205).
Department:
Bureaucratic (202).
Director of Agriculture should control (205).
should be Independent of Agricultural Department (205).
Dispensaries:
Control:
is by District boards (205).
by Provincial authority, discussed (205).
Expansion inadequate (205).
Touring, not fully used (205).
Use of, by agriculturists, not full (205).
Indigenous methods:
Research necessary (205) 66526.
Resorted to because cheap and easily available (205).
Research: should be organised in the same way as recommended for agriculture (199).

WELFARE OF RURAL POPULATION:

Clubs and gymnasia recommended (206).
Hospitals:
Co-operative suggested (207) 66506-7.
Lack of, 66506-7.
Kisan Sabha: an organisation of tenants, 66514-8.
Politics, a camouflage when divorced from economic development (197) 66514-8.

SINHA, D. P.—contd.

WELFARE OF RURAL POPULATION—*contd.*

Population, pressure of, upon the land:
Colonisation abroad recommended as a temporary expedient (204) (208) 66508-10.
Education would check growth of population, 66508-10.
Families, large, a cause of indebtedness (203).
Standard of life, raising of, would check growth of population, 66508-13.
Provincial Development Board suggested (208) 66486-8.
Standard of life:
Improvement of, among those in contact with towns (66511).
Outlook as to, not well regulated, 66511-3.
Surveys, economic:
Chanakya Society in Patna College, work of (208).
Recommended (208).
Village life should be improved (208).

SINHA, MITHILA SARAN, Advocate, Bankipur District, Patna (298-301).

ANIMAL HUSBANDRY: Fodder scarcity, 66979-80.

CO-OPERATION: Irrigation schemes suggested, 66981-5.

CROPS AND CROP PROTECTION:

Rice:
Cost of cultivation Rs. 8 or Rs. 10 per *bigha*, 67010.
Output, average, 10 maunds of paddy per *bigha*, 67007-8.

FERTILISERS:

Cowdung:
Scarcity of, 66993-9.
Use of, as fuel: *rahar* cultivation recommended (299) 67000-1, 67004-6.
Green manure: Dhaincha and sann for paddy lands recommended (299) 67002-3.

IRRIGATION:

Co-operation suggested, 66981-5.
District boards might keep boring plants, 66984-5.
Government assistance suggested, 66984-5, 66989-90.
Schemes suggested (298) 66981-5.

SOILS:

Alkali land:
Groundnut cultivation recommended (299) 66986-8.
Irrigation recommended (299).
Drainage, importance of (298-9) 66991-2.
Reclamation:
Drainage Act recommended (299) 66991-2.
Irrigation recommended (299).
Sandy taur lands in Patna District show marked improvement (299).

SOILS:

ALKALI LAND:

Draining recommended, *Khan* (445).
Expert advice necessary, *Arikshan Sinha* (264).
Flooding found successful, *Arikshan Sinha* (264), *Khan* (445).
Groundnut cultivation recommended, *Sinha, M. S.* (299) 66986-8.
Gypsum recommended, *Khan* (445).
Irrigation recommended, *Sinha, M. S.* (299), *Lal* (303).
Analysis, facilities for, necessary, *Sinha, D. P.* (199).
Classification, *Arikshan Sinha* (263).

DRAINAGE:

Act recommended, *Sinha, M. S.* (299) 66991-2.
Agricultural Engineer's staff should be increased, *Sethi* (354).

SOILS—contd.

DRAINAGE—*contd.*

Co-operative, recommended, *Arikshan Sinha* (271).
Demonstration, *Sethi* (354).
Importance of, *Arikshan Sinha* (263) (266), *Sinha, M. S.* (298-9) 66991-2, *Khan* (445).
Khunti sub-division, co-operative drainage has improved soil, *Ghose* (382).
of Lakes advised, *Atkins* (19).
Loans, taccavi and under Land Improvement Act, recommended, *Sethi* (354).
of Low-lying lands of Bihar, system should be devised, *Khan* (445).
Necessary, *Lal* (304), *Ghose* (381-2), *Narendra* (409).

EROSION :

Bunds recommended, *Arikshan Sinha* (270), *Ghose* (382), *Khan* (446).
in Chota Nagpur :
the Cause of poor soil in uplands, *Dobbs* (61).
Serious, *Ghose* (382).
Drainage recommended, *Lal* (304).
by Floods, *Henry* (3-4), *Atkins* (19).
caused by destruction of, Forests, *Foley* (228), *Ghose* (382) (389), *Gibson* (416-7), *Khan* (451).
Levelling recommended, *Lal* (303-4).
Ridges recommended, *Lal* (303).

FLOODING :

Deteriorating of land by, *Khan* (446).
Improvement of land by, *Khan* (446).

FLOODS :

Committee of Enquiry, *Bery*, 67123-9.
Crops resisting, *Narendra* (409).
Drainage, *Bery*, 67130-4.
Erosion causes marked deterioration, *Atkins* (19), *Narendra* (410) 67841-4.
Protective schemes recommended, *Arikshan Sinha* (262) (270).
Rivers :
Beds, raising of, *Bery*, 6714-29.
Bunds, *Bery*, 67109-29, 67142-3.
Changing course, *Bery*, 67135-43.
Silt deposit causes marked improvement, *Atkins* (19). (*See* Silt *below*).
Forest destruction has led to deterioration of soil in Chota Nagpur, *Ghose* (382). (*See* Forests, *under* EROSION *above*).
Improvement : better methods of cultivation, farmyard manure and drainage advised, *Atkins* (18), *Lal* (303).
Kanke Government farm, great improvement of soil, *Dobbs* (62), *Ghose* (382).
Phosphates, areas deficient in, *Dobbs*, 65634.

RECLAMATION : (*See also* ALKALI LAND *above*).

Demonstration by Agricultural Department recommended, *Khan* (446).
Drainage, *see above*.
Expert advice necessary, *Arikshan Sinha* (264).
Grants-in-aid recommended, *Arikshan Sinha* (264).
Ground-nut cultivation recommended, *Lal* (303).
Instance of marked improvement, *Henry* (4).
Irrigation recommended, *Sinha, M. S.* (299).
Loans without interest suggested, *Arikshan Sinha* (264).
Middle classes youths should be given financial assistance to develop uncultivated land, *Atkins* (19).
Subsidies recommended, *Khan* (446).
Til cultivation recommended, *Lal* (303).
Research necessary, *Sinha, D. P.* (199).
Rice *raya* or *sandha* disease due to poverty of soil, *Ghose* (378) (382-3).
Sandy taur lands in Patna District show marked improvement, *Sinha, M. S.* (299).

SOILS—contd.

SILT :

Bagmati River water beneficial, *Arikshan Sinha* (264).
sometimes Beneficial but sometimes injurious, *Arikshan Sinha* (264).
Floods, deposit by, causes marked improvement, *Atkins* (19).
Gandak River water North of Muzaffarpur injurious, *Arikshan Sinha* (264).

Silting, *see under* **IRRIGATION.**

SURVEY :

Dobbs, 65630-4.
Necessary, *Sethi* (354) 67595-9, *Ghose* (381).

SPINNING, *see that title and* CHARKA *under* **AGRICULTURAL INDUSTRIES.**

STATISTICS :

Based upon guesses, *Dobbs*, 65708-16.
Census of livestock and implements :
Methods defective, *Roy, N. K.* (499).
Time of taking should be the same as that of population census, *Roy, N. K.* (499).
Collection of, by Central Co-operative Banks' staff, with the help of Government subsidies, *Roy, S. K.* (469).
Committee appointed by Government of India two years ago; recommendations disregarded, *Sinha, D. P.* (208).
Compilation, *Tuckey*, 66924-36.
Director of Agriculture in charge of, *Dobbs*, 65708-16.
Extension recommended, *Arikshan Sinha* (272).
Holdings, *Tuckey* (283-4) (287-8) 66940-7.
Hubback's scheme, *Tuckey* (288) 66914.
Importance of, *Sinha, D. P.* (208).
Officer, whole-time : question of, *Dobbs* (69).
Progress : very little, *Sinha, D. P.* (208).
Records of rights, attempt to keep up-to-date a failure, *Tuckey*, 66899-903.
Seasonal crop statistics :
Checking by sampling necessary, *Dobbs* (68).
Worthless, *Dobbs* (68) 65626-9, 65708-16.
Settlement figures : misleading as to size of holdings, *Tuckey* (283-4) (287-8) 66963-4.
Touch between Departments of Agriculture and Land Records might be closer, *Tuckey* (288) 66915-6, 66924-36.
Village societies should be utilised to collect, *Khan* (453-4).

STEAMERS, *see under* TRANSPORT *under* **ADMINISTRATION.**

SUBSIDIARY INDUSTRIES, *see* **AGRICULTURAL INDUSTRIES.**

SUGAR BUREAU, *see under* **RESEARCH.**

SUPERIOR PROVINCIAL AGRICULTURAL SERVICE, *see under* **AGRICULTURAL DEPARTMENT.**

SURVEYS (economic), *see under* **WELFARE OF RURAL POPULATION.**

TACCAVI, *see under* **FINANCE.**

TANKS, *see under* **IRRIGATION.**

TARIFFS AND SEA FREIGHTS :

Exports, agricultural, small tax to finance Central Board of Agriculture suggested, *Sinha, D. P.* (199) 66527-30.
Export duties on agricultural produce should be reduced, *Khan* (451).
Import duties on agricultural implements should be reduced, *Khan* (451).
Protection :
would Adversely affect cultivators, *Sinha, D. P.* (197) (207) 66527-30.
Recommended, *Narendra* (411) 67845-60.

TARIFFS AND SEA FREIGHTS contd.

Reduction of custom duties and sea freights on agricultural produce recommended, *Arikshan Sinha* (270).

Steamers, *see under* TRANSPORT, *under* **ADMINISTRATION.**
Sugar, temporary import duty to prevent dumping, necessary, *Meyrick* (429-30) 68110-21, 68180-3.

TELEGRAPHS, *see* POSTS AND TELEGRAPHS *under* **ADMINISTRATION.**

TENANCY, *see under* **LAND TENURE.**

THIKADARI SYSTEM, *see under* **LAND TENURE.**

TRACTORS, *see under* **IMPLEMENTS.**

TRAMWAYS, *see under* TRANSPORT *under* **ADMINISTRATION.**

TRANSPORT, *see under* **ADMINISTRATION.**

TUCKEY, A. D., I.C.S., Director of Land Records and Surveys, Bihar and Orissa (277-98).

ADMINISTRATION:
Reforms, effect of, upon agriculture, 66890-1.

AGRICULTURAL INDEBTEDNESS:
Causes of borrowing: improvidence, ceremonies, uncertainty of agricultural income, lack of subsidiary industries, litigation (282).
Courts should have power to go behind documents and take accounts (282).
Damdopat: (280) 66906-8, 66948-9.
Interest:
cannot Exceed principal in Santal Parganas (280) 66906-8, 66948-9.
Restriction to 25 per cent suggested (282).
Usury should be made penal (282).
Measures to relieve agriculture's burden of debt:
Usurious Loans Act, penalisation of usury, co-operative banks (282-3).
Moneylenders:
Thikadari system (286-7).
Unscrupulous (282-3).
Mortgages: restriction of (283) 66904-5, 66937-9.
Repayment prevented by: lack of earnestness, limited resources, accumulation of old debts, exorbitant interest (282).
Usurious Loans Act:
Enforcement recommended (282).
Ignorance of, among ryots, 66906-8.

AGRICULTURAL INDUSTRIES:
Industrial concerns, movement to rural areas: not recommended (285).
Leisure period: cultivator has work for about six months on holding (285).
Obstacles: caste prejudice and lack of marketing organisation (285) 66951-4.
Preparation of agricultural produce for consumption:
Government action not recommended (285).
Private enterprise recommended (285).

AGRICULTURAL LABOUR:
Diseases decrease efficiency of labour (285).
Forced labour (280) (287).
Shortage: seasonal only (285).

CAPITAL, ATTRACTING OF, TO AGRICULTURE:
Improvements discouraged by: sub-division of proprietory rights in land, landlords' lack of education and interest, thikadari system of leasing villages to temporary tenure holders (*see under* LAND TENURE), restrictions of tenancy legislation, insecurity of tenure, oppression of landlords, litigation (286-7) 66890-1, 66898, 66921-3.

TUCKEY, A. D.—contd.

CO-OPERATION :

Credit societies :
Extension necessary (281).
Loans :
for Ceremonies should not be given (281).
Long-term (281) 66877-80.
Tenants, effect upon, of co-operative movement, 66896-7.

FINANCE :

Taccavi :
Administration expenses high (281-2).
through Co-operative societies recommended (282).
Difficulties in obtaining (281).
of Doubtful advantage to cultivators (281).
Used for purposes other than that for which granted (281).

HOLDINGS :

Consolidation, obstacle to : lack of interest, inheritance laws, traffic in part holdings, restriction on alienation, mutual distrust (284).
Education as to fragmentation necessary (284).
Fragmentation :
Increasing (283).
very Marked (283).
Government estates, consolidation in, should be attempted first (284) 66909-13.
Legislation to enforce consolidation premature (284) 66909.
Statistics (283-4) 66940-7.

IRRIGATION :

Bunds (285).
Extent of (284-5) (289) 66931-6, 66950.
Land Tenure as affecting, (279) 66868-70, 66889.
Minor irrigation schemes : openings for, 66881-8.
Permanent settlement as affecting, 66868-70, 66965-9.
Private canals, 66931-6.
Ryots should be encouraged to make their own irrigation works (285).
Tanks (285).

LAND TENURE :

Bengal Tenancy Act (278).
Chota Nagpur Tenancy Act (279) 66904-5.
Co-operative movement, effect upon position of tenants, 66896-7.
Dispossession of ryots (279-80).
Landlords' methods of oppressing tenants (280-1) (286-7) 66871-6, 66917-8, 66958. (*See* Rent receipts and Thikadari, *below*).
Orissa Tenancy Act (280).
Permanent settlement (278) (280) 66868-70, 66920, 66965-9.
Produce rent :
Commutation (285).
Cultivators legal occupancy rights of, not usually recognised in such holdings (278) 66946-7.
Importance of problem (278).
Irrigation, effect upon (279).
Output adversely affected (278-9) 66921-3.
Proprietor's private lands (278).
Relations between landlords and tenants, a serious obstacle to agricultural improvements, 66898, 66921-3.
Rent-receipts not given (280) 66873-6, 66892-5, 66959-62.
Sub-division of proprietary interests (278) (286-7) 66940-7.
Survey (281).
Tenancies (283-4) 66946-7.
Tenancy law, complicated (277-8) 66919.
Thikadari system (286-7) 66955-7, 66962.
Transfer of occupancy rights is subject to consent of landlord (278-80).

TUCKEY, A. D.—concld.

MARKETING :
Subsidiary industries prevented by lack of marketing organisation (285).

STATISTICS :
Compilation, 66924-36.
Holdings (283-4) (287-8) 66940-7.
Hubback's scheme (288) 66914.
Records of rights, attempt to keep up-to-date a failure, 66899-903.
Settlement : misleading as to size of holdings (283-4) (287-8) 66963-4.
Touch between Departments of Agriculture and Land Records might be closer (288) 66915-6, 66924-36.

WELFARE OF RURAL POPULATION :
Diseases decrease efficiency of labour (285).
Landlords' oppression : *see under* LAND TENURE.
Serfs (280-1) (285-6).

USURIOUS LOANS ACT, *see under* **AGRICULTURAL INDEBTEDNESS.**

USURY, *see under* **AGRICULTURAL INDEBTEDNESS.**

VETERINARY : (*See under* **QUINLAN.**)

College, *see* VETERINARY COLLEGE *under* **EDUCATION.**

CONTAGIOUS DISEASES :
no proper Arrangements for dealing with, *Arikshan Sinha* (267).
Legislation :
Compulsory, time not ripe for, *Heycock* (222).
Necessary, *Khan* (448).
Recommended, *Atkins* (20), *Arikshan Sinha* (267), *Narendra* (410).
Useless, *Sinha. D. P.* (205).
Obstacles to dealing with :
Ignorance and prejudice *Heycock* (222).
Superstition, *Atkins* (20).
Propaganda recommended, *Sinha, D. P.* (205).
Co-operative assistance recommended, *Ghose* (385).

DEPARTMENT :
of no Benefit to cultivators, *Arikshan Sinha* (260) 66813-6.
Bureaucratic, *Sinha, D. P.* (202).
Director of Agriculture should control, *Sinha, D. P.* (205), *Khan* (448).
Expansion too slow, *Heycock* (220) 66738-9.
Finace inadequate, *Khan* (448).
should be Independent of agricultural Department, *Dobbs*, 65442-3, *Sinha, D. P.* (205).
Legislative Council's appreciation of, *Dobbs*, 65684.
Services :
Inadequate, *Khan* (444).
not Satisfactory, *Narendra* (408).
Staff :
Inadequate, *Atkins* (17), *Khan* (448).
Lower grades should be considerably increased, *Roy, S. K.* (459).
Students :
Employment in Subordinate Service, *Quinlan*, 65819-23.
Supply adequate, *Quinlan*, 65816-8.
Veterinary State Scholars :
System unsatisfactory, *Quinlan*, 65984-92, 66026-7.
Trained in England, *Quinlan*, 65731-7.
Successful, *Henry* (2).
more Touring advised, *Atkins* (20).
Development Officer should control Veterinary, Agricultural and Co-operative Departments, *Heycock* (222) 66583-7, 66662.
Disease, *see* CONTAGIOUS DISEASES *above.*

VETERINARY—contd

DISPENSARIES :

Control :
District boards control, *Atkins* (20), *Sinha, D. P.* (205), *Heycock* (222) 66750-1.
District boards do not provide sufficient funds, *Meyrick* (429) 68136-7, 68159-68.
by District boards, not satisfactory, *Khan* (448).
Provincial compared with local, *Heycock* (222).
by Provincial authority, discussed, *Sinha, D. P.* (205).
Provincial, transfer to, recommended, *Arikshan Sinha* (266), *Meyrick* (429) 68159-68, *Khan* (448).
System working fairly well, *Atkins* (20), *Heycock* (222).
Expansion inadequate, *Sinha, D. P.* (205), *Heycock* (222), *Arikshan Sinha* (266), *Meyrick* (429) 68136-7, 68159-68, *Khan* (448).
Finance : lack of funds, *Heycock* (222) 66750-1.
Inadequate, *Arikshan Sinha*, 66814-6.
Propaganda as to, recommended, *Ghose* (385).
Services : system works well, *Atkins* (20).
Staff insufficient, *Atkins* (20).
one in each Sub-division recommended, *Khan* (441).
Touring :
not Fully used, *Sinha, D. P.* (205).
Practically do not exist, *Atkins* (20).
Staff insufficient, *Khan* (448).
Use of, by agriculturists, not full, *Atkins* (20), *Sinha, D. P.* (205), *Ghose* (385), *Khan* (448).

Education, *see* VETERINARY *under* EDUCATION.

INDIGENOUS METHODS :

Co-ordination with Western methods recommended, *Narendra* (408).
should be Examined, *Narendra* (407) (410).
Research necessary, *Sinha, D. P.* (205) 66526.
Resorted to because cheap and easily available, *Sinha, D. P.* (205).

INOCULATION :

Cultivators willing, *Meyrick*, 68137.
Fees, none charged, *Khan* (448).
Prejudice against :
Co-operative propaganda is removing, *Ghose* (385).
Dying out, *Henry* (2), *Khan* (448).
Local control removes prejudice, *Heycock* (222).
Overcome, *Dobbs*, 65684.
being Overcome gradually, *Heycock* (222) 66588.
Serum-simultaneous :
Recommended, *Sethi*, 67545-6.
of Uneconomic cattle not recommended, *Sethi*, 67545-6.
Staff insufficient, *Ghose* (385).

RESEARCH :

Inadequate, *Khan* (448).
Indigenous methods, research necessary as to, *Sinha, D. P.* (205) 66526.
Laboratory in each district recommended, *Khan* (441).
Necessary, *Arikshan Sinha* (267), *Narendra* (407) (410).
should be Organised in the same way as recommended for agriculture, *Sinha, D. P.* (199). (*See* BOARDS OF AGRICULTURE *under* ADMINISTRATION.)
Provincial institution and officers advocated, *Arikshan Sinha* (267), *Khan* (448).
Rinderpest, co-operation by Feudatory States suggested, *Heycock*, 66588-90. (*See also* INOCULATION *above*).
Serum : supply insufficient, *Khan* (448).

VETERINARY—concld.

STAFF :

Gowalas should be trained and employed, *Ghose* (385) 67741-3.
Insufficient, *Ghose* (376-7).
Limited, *Heycock* (220).
Veterinary Assistants should be deputed to each village, *Khan* (441) (444).
Superior Veterinary Officer with the Government of India, appointment recommended, *Khan* (448), unnecessary, *Arikshan Sinha* (267).
Training of men of *gowala* caste recommended, *Ghose* (385) 67741-3.

WAGES, *see under* **AGRICULTURAL LABOUR.**

WATER HYACINTH : none in Canals or rivers, *Bery*, 67144-7.

WATERLOGGING : Son canal area waterlogged, *Dobbs*, 65626-30.

WEAVING *see under* **AGRICULTURAL INDUSTRIES.**

WELFARE OF RURAL POPULATION (*See also under* **ROSS.**)

Administrative machinery insufficient, *Dobbs* (68).
Clubs and gymnasia recommended, *Sinha, D. P.* (206).
Conditions as to poverty and ignorance appalling, *Khan* (440) (453).
Diet : investigation suggested, *Dobbs* (67-8).
Diseases decrease efficiency of labour, *Tuckey* (285).
Dispensaries :
Inadequate, *Atkins*, 65132-5.
Municipal control, *Atkins*, 65133-5.

DRINKING WATER :

very Bad, *Atkins*, 65102.
Legislation necessary, *Atkins*, 65106-8.
Wells :
Closed well with pump recommended, *Phillips* (336).
Contaminated, *Atkins*, 65103-5.
Expenditure, increase advocated, *Arikshan Sinha* (272).
Grain, increased price of, has benefited cultivators, *Khan* (453).

HEALTH : (*See also under* **AGRICULTURAL INDUSTRIES.**)

Department, no organic connection with co-operative movement, *Roy, N. K.*, 68370-3, 68393.
Improvement : economic improvement and spread of literacy necessary, *Narendra* (411-2).
Posters useless, *Roy, N. K.*, 68372-3.
Societies, village, recommended, *Phillips* (336), *Khan* (452).
Weeks recommended, *Phillips* (335-6), *Roy, N. K.* (493) (495) 68370-3.

HOSPITALS :

Co-operative, suggested, *Sinha, D. P.* (207) 66506-7.
District boards in favour of, to the detriment of other activities, *Heycock*, 66749, 66755-6.
Lack of, *Sinha, D. P.*, 66506-7.

HYGIENE :

Propaganda on market days : Recommended, *Phillips* (335).
in Schools :
Teaching, and text books, necessary, *Phillips* (335).
Kisan Sabha : an organisation of tenants, *Sinha, D. P.*, 66514-8.
Landlords' oppression : *see under* LAND TENURE.

LITIGATION : (*See also under* CAUSES OF BORROWING *under* **AGRICULTURAL INDEBTEDNESS.**)

WELFARE OF RURAL POPULATION—contd.

HYGIENE—*contd.*

Arbitration, co-operative, suggested, *Ghose* (391) 67699-703, *Roy, N. K.* (493).
the greatest Curse of Bihar, *Prasad* (161-2) 66456-7.
Improvements discouraged by, *Tuckey* (286-7) 66890-1, 66898, 66921-3.
Legislation, *see under* **HOLDINGS.**
Panchayat system disorganised, *Ghose* (378-9).
Malaria: pisciculture recommended, *Sethi*, 67507-8.
Model villages recommended, *Phillips* (335-6).
Moral standard of people, very low, *Ghose*, (389-90) (395).
Officer of Provincial Civil Service should be posted to each thana to act as a focus for all local interests, *Dobbs* (68).
Organisation, rural: active campaign suggested, *Dobbs* (48-49) 65532-46.
Policy of Government criticised, *Arikshan Sinha* (256-7) (272-3) 66822.
Politics, a camouflage when divorced from economic development, *Sinha, D. P.* (197) 66514-8.

POPULATION, pressure of, upon the land:

in Chota Nagpur very thin, *Ghose* (387-8).
Colonisation abroad recommended as a temporary expedient, *Sinha, D. P.* (204) (208) 66508-10.
too Dense, *Heycock* (223).
Dobbs (48).
Education would check growth of population, *Sinha, D. P.*, 66508-10.
Increasing, *Sethi* (359).
Indebtedness:
Large families a cause of, *Sinha, D. P.* (203), *Narendra* (408) (411).
Pressure of population, the most potent cause of, *Prasad* (161-2).
Standard of life, raising of, would check growth of population, *Sinha, D. P.*, 66508-13.

POVERTY:

Based on physical conditions, *Dobbs* (67).
Caused by smallness of holdings and dispossession of cultivators, *Ganga Vishnu*, 65326-33, 65368-70, by large families, *Narendra* (408) (411).
Cumulative, *Dobbs* (48).
Provincial Development Board suggested, *Sinha, D. P.* (208) 66486-8.
Ranchi district: condition of the people most deplorable, *Ghose* (396) 67699-703.
Rural betterment co-operative societies advocated, *Atkins*, 65100-1.

SANITARY CONDITIONS OF VILLAGES:

Boy Scout organisation recommended, *Phillips* (336).
Co-operation suggested, *Phillips* (336).
Importance of, *Phillips* (335).
Prejudice of villagers, *Phillips* (335).
Prizes suggested, *Phillips* (336).
Taccavi should be conditional upon, *Phillips* (336).
Serfs, *Tuckey* (280-1) (285-6).
Standard of life:
Improvement of, among those in contact with towns, *Sinha, D. P.* 66511.
Outlook as to, not well regulated, *Sinha, D. P.* 66511-3.
Status improved by joining co-operative society, *Prasad*, 66401.

SURVEYS, ECONOMIC:

Chanakya Society in Patna College, work of, *Sinha, D. P.* (208).
Co-operative:
Assistance recommended, *Ghose* (395-6).
Assistance of Central Co-operative Banks, recommended, *Roy, S. K.* (469)
Recommended, *Sinha, D. P.* (208), *Arikshan Sinha* (272), *Ghose* (395), *Khan* (453), *Roy, N. K.*, (499).
Scope of enquiry, *Ghose* (395-6).
Terrorism of ryots by smaller landlords, *Dobbs* (56) (66).
Union boards:
Clerks should be qualified sanitary or health inspectors, *Phillips* (336-7).
Recommended, *Phillips* (337).

WELFARE OF RURAL POPULATION—concld.

SURVEYS, ECONOMIC—contd.

Village Administration Act, 1892, extension recommended, *Prasad* (164) 66380-1.
Village life should be improved, *Sinha, D. P.* (208), *Fawcus* (316-7).

Welfare societies, *see under* **CO-OPERATION.**

WELLS, *see under* **IRRIGATION,** *and* DRINKING WATER *under* **WELFARE OF RURAL POPULATION.**

WILD ANIMALS, damage by, *see under* **CROPS AND CROP PROTECTION.**

ZAMINDARS, *see* LANDLORDS *under* **LAND TENURE.**

GLOSSARY

Ahwab ..	.. An illegal addition to rent demanded by a superior from an inferior holder of land.
Aghani (crop)	.. The crop which is harvested in the month of Aghan (November-December).
Ahar (Ahara)	.. A reservoir for collecting water for irrigation.
Ail ..	.. A division between fields ; a boundary mark.
Anda ..	.. Castor (*ricinus communis*).
Bajra ..	.. A small millet (*pennisetum typhoideum*).
Bakain ..	.. The Persian lilac (*melia azedarach*).
Bakasht-Bakast	.. *See* Sir.
Balsumbhi soil	.. Sandy loam.
Bangar ..	.. High land.
Bania ..	.. A Hindu grain trader who is generally also a moneylender.
Batai ..	.. Payment of rent in kind, by division of produce between landlord and tenant.
Batwara officer	.. A revenue officer.
Begari ..	.. Forced labour.
Bhadai ..	.. The crop gathered in the month of Bhadon (August-September).
Bhadralog	.. Gentleman.
Bhith ..	.. Ground either naturally or artificially raised.
Bhusa ..	.. The husk or chaff of grain ; the straw.
Biali ..	.. Land on which only summer paddy is grown.
Bigha ..	.. A measure of land ; the standard or *pucca bigha* is 3,025 square yards or five-eighths of an acre ; a *kutcha bigha* is in some places one-third, and in others one-fourth, of the "*standard bigha.*"
Brahmani bull	.. A bull dedicated, on the death of a Brahmin, as an act of piety and as a public service.
Bund, Bundh	.. A dam, field embankment.
Charka ..	.. A spinning wheel.
Charpoy ..	.. A bedstead, with tape stretched across the frame for a mattress.
Chaukidar	.. A watchman.
Chaura ..	.. Land intermediate in position between upland and lowland.
Dahi ..	.. Curd.
Dahia ..	.. A variety of paddy.
Dalal ..	.. An agent or broker.
Damdopat	.. Literally "double the principal". An ancient Hindu provision of law under which a Court, in passing a decree for principal and interest, cannot from that date allow interest in excess of the principal.
Darpatni	.. A sub-letting of the whole or part of an estate held on permanent lease to a sub-tenant on the same system.
Dast-khat	.. Signature.
Desi ..	.. Indigenous.
Dhaincha	.. A leguminous fibre plant often grown for green manuring (*sesbania aculeata*).
Dhan ..	.. A term applied to grain in general but especially to paddy.
Diara ..	.. Alluvial land.
Dih ..	.. Land of the best quality.
Don ..	.. Low-lying land.
Eri ..	.. A species of silk worm (*attaeus ricini*).
Gairmajura	.. Uncultivated land.
Ganja ..	.. A narcotic derived from the unfertilised flowers of *cannabis sativa.*
Gaontia ..	.. A village headman.
Gharriwalla	.. The driver of a horse or bullock carriage.
Go ..	.. Clarified butter.
Gowa ..	.. A granary, store room.
Ghilala ..	.. A herdsman or milkman.

Gundli .. .. A small millet (*panicum miliare*).
Gur .. .. Unrefined Indian sugar, jaggery.
Guru .. .. A teacher, especially a religious teacher.

Haisyat .. .. A statement of assets and liabilities.
Hakim .. .. A practitioner of one of the Indian systems of medicine.
Hasta (rain) .. Rain received towards the end of September.
Hat .. .. A market.
Hath .. .. A measure of one cubit's length.
Hundi .. .. A bill of exchange.

Indrasail .. A variety of paddy.

Janera .. .. A fodder jowar.
Jolaha .. .. A weaver.
Jote .. .. Cultivated land.
Jowar (Juar) .. The large millet (*sorghum vulgare*).

Kala-azar .. A malignant fever, common in north-east India, caused by infection with the parasite Leishmania Donovani.
Kamdar .. .. A fieldman in the Agricultural Department.
Kamia (adj. Kamiauti). An agricultural labourer who works under an agreement.
Katbhat .. .. A heavy intractable clay soil.
Katha .. .. A measure of land equivalent to eighty square yards.
Kesari .. A pulse (*lathyrus sativus*).
Khalsa .. .. Lands or villages held immediately of Government.
Khansama .. A house servant.
Kharif .. .. The autumn harvest; crops sown at the beginning of the rains and reaped in October-December.
Khas-Mahal .. Land under the direct control of Government and let out by them to tenants.
Khatian .. .. An abstract kept by the village accountant showing the land held by each cultivator, nature of tenure, cropping, etc.
Kisan .. .. A cultivator.
Kist .. .. An instalment of rent or revenue.
Kist Kothiwalla .. The proprietor of a loan office (kist kothi).
Kumri .. .. Temporary cultivation in jungle clearings.
Kundi .. .. A bucket (usually of iron) used with the latha for drawing water (*see* Latha).
Kutcha .. .. Inferior or bad (Lit., not solid).

Laggi .. .. A measuring rod.
Latha .. .. A lever (made of wood or bamboo) used with a bucket and counterpoise for raising water.
Lichi .. .. An evergreen fruit tree (*nephelium litchi*).

Ma Bap .. .. A protector (Lit., Mother and Father).
Mahajan .. A merchant.
Makai .. .. Maize (*zea mays*).
Manjhihas .. The landlord's private land reserved for the cultivation of the immediate head of the village.
Marua .. .. A small millet (*eleusine coracana*).
Marwari .. .. A banker, broker, merchant.
Masur .. .. Lentil (*lens esculenta*).
Matiar .. .. A brown clay loam, well adapted for rice. It contains about sixty or seventy per cent of clay.
Maund .. .. A measure of weight of 82·28 lbs. (standard maund). Has different values for different commodities and for the same commodity in different localities.
Mela .. .. A religious fair.
Mistri .. .. A mechanic, carpenter, blacksmith, etc.
Mofussil .. .. The country as opposed to the town.
Moong, Mung .. Green gram (*phaseolus radiatus*).
Mote, Moth .. The kidney bean (*phaseolus aconitifolius*).
Munsiff .. .. Judge of the lowest court with civil jurisdiction.

Nullah .. .. A water course,

Paikar .. .. A wholesale dealer.
Pain, Pyne .. A water channel.
Paira .. .. A cold weather crop sown broadcast in standing paddy as the water begins to dry off.
Panch, Panchayat. Pancha, Lit. a committee of five. An association, of any number of persons, instituted for objects of an administrative or judicial nature.
Pargana .. .. A district; an administrative unit.
Parwal .. .. The snake gourd (*trichosanthes anguina*).
Passeri .. .. A weight or measure of five seers.
Pathkatail .. A term used in Tirhut to denote clayey soil.
Patta .. .. A document of lease.
Patti, Patni .. A division of land.
Patwa .. .. Red sorrel (*hibiscus sabdariffa*).
Patwari .. .. The village accountant or registrar.
Peish cush .. Government land revenue.
Pinjrapole .. A refuge home for cattle.
Pucca .. .. Solid, correct, complete, etc. (the contrast in all respects to kutcha).
Pundit .. .. Originally, a learned Brahmin, a teacher; now a term of respect applied to Brahmins.

Rab .. .. A stage in the conversion of cane juice into sugar.
Rabi .. .. The spring harvest; crops sown in autumn and reaped at the end of the cold weather.
Rahar (Arhar) .. A variety of pulse (*cajanus indicus*).
Raj .. .. A state or estate.
Rakhant .. .. Waste woodland.
Raya .. .. *See* Sandha.
Reharaland .. Land impregnated with sodium salts and thereby rendered barren.
Ryot .. .. A cultivator.

Sabha .. .. An association.
Sal .. .. A forest tree (*shorea robusta*).
Salami .. .. Fee or premium payable to a person, generally a zamindar or a landlord, for the recognition of a transaction in property in which he has an interest.
Sanai, Sann .. Bombay hemp, a leguminous fibre crop (*crotalaria juncea*); also used as a green manure.
Sandha .. .. The appearance of rush-like stems instead of flowers in rice, caused by a gall fly the larva of which feeds on the base of the stem.
Sarso (Sarson) .. An oil seed (*brassica campestris*).
Sawai .. .. An excess of one-fourth; interest at the rate of 25 per cent.
Seer .. .. A weight (2·057 lb.).
Shisham .. .. A deciduous tree (*dalbergia sissu*).
Sir .. .. Home farm land; the personal, family or private holding of a proprietor or co-sharer.
Siris .. .. A deciduous tree (*acacia lebbek*).
Sowcar .. .. A moneylender.
Sradh .. .. A religious ceremony on the termination of the period of mourning.
Sumbhi .. Loam.
Surguja .. .. An oilseed (*guizotia abyssynica*).
Swaraj .. Self-Government.

Taccavi (Takavi) .. An advance made by Government to cultivators for agricultural purposes.
Tal .. .. A dam.
Talukdar .. .. A big landowner.
Taur .. .. Upland.
Thana .. .. A police station; a post.
Thika .. .. A contract by which a person engages to pay a fixed amount of revenue on an estate, etc., on being allowed to collect the revenue payable to the proprietor. Thikadar—one who takes up such a contract.

Tikli ..	.. A rope-twisting or cotton-spinning implement; a device consisting of a flat stone with a hook to which the rope or cotton is fastened as it is being twisted.
Til ..	.. An oilseed (*sesamum indicum*).
Tisi ..	.. Linseed (*linum usitatissimum*).
Tum-tum	.. A vehicle drawn by horse or bullock.
Upanayan	.. Investiture with the sacred thread.
Urid	.. A pulse (*phaseolus mungo*).
Usar ..	.. Land impregnated with sodium salts and thereby rendered barren.
Zabardast	.. Powerful, oppressive.
Zamindar	.. A landowner, a peasant proprietor.
Zarpesgi ..	.. Mortgage with possession.
Zerat, Zirat.	.. *See* Sir.

BOMBAY: PRINTED AT THE GOVERNMENT CENTRAL PRESS.

Royal Commission on Agriculture in India.

VOLUME XIV.

Appendix to the Report.

LONDON:
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.
To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh;
York Street, Manchester; 1, St. Andrew's Crescent, Cardiff;
15, Donegall Square West, Belfast;
or through any Bookseller.

1928

PRINTED IN INDIA

Price 7s. 9d. net.

70-186-14

CONTENTS

ASSAM

		Page
1.	General Features	1
2.	Natural Divisions	3
3.	Provincial Income and Expenditure	5
4.	Revenue Administration and Land Records ..	10
5.	The Cultivator	14
6.	The Agricultural Department	15
7.	The Veterinary Department	18
8.	Irrigation	19
9.	Forestry in relation to Agriculture	20
10.	General Education	21
11.	Co-operation	22
12.	Communications and Marketing	24
13.	Local Self-Government	26
14.	Public Health and Sanitation	27
	Map .. .. .. *facing page*	1
	Graph .. .. .. *facing page*	5

BENGAL

1.	General Features and Natural Divisions	30
2.	Provincial Income and Expenditure	34
3.	Revenue Administration and Land Records ..	39
4.	The Cultivator	43
5.	The Agricultural Department	48
6.	The Veterinary Department	55
7.	Irrigation	56
8.	Forestry in relation to Agriculture	57
9.	General Education	58
10.	Co-operation	64
11.	Communications and Marketing	68
12.	Local Self-Government	70
13.	Public Health and Sanitation	73
	Map .. .. .. *facing page*	30
	Graph .. .. .. *facing page*	32

BIHAR AND ORISSA

		Page
1.	General Features and Natural Divisions	77
2.	Provincial Income and Expenditure	79
3.	Revenue Administration and Land Records ..	86
4.	The Cultivator	88
5.	The Agricultural Department	92
6.	Livestock Work and the Veterinary Department ..	96
7.	Irrigation	99
8.	Forestry in relation to Agriculture	101
9.	General Education	101
10.	Co-operation	104
11.	Communications and Marketing	106
12.	Local Self-Government	107
13.	Public Health and Sanitation	110
	MAP .. .. .. *facing page*	77
	GRAPH .. .. .. *facing page*	78

BOMBAY

1.	General Features	113
2.	Provincial Income and Expenditure	115
3.	Revenue Administration and Land Records ..	118
4.	The Cultivator	120
5.	The Agricultural Department	122
6.	The Veterinary Department	128
7.	Irrigation	128
8.	Forestry in relation to Agriculture	130
9.	General Education	131
10.	Co-operation	133
11.	Communications and Marketing	135
12.	Local Self-Government	137
13.	Public Health and Sanitation	138
	MAP .. .. .. *facing page*	113
	GRAPH .. .. .. *facing page*	115

BURMA

		Page
1.	General Features	140
2.	Natural Divisions	141
3.	Provincial Income and Expenditure	143
4.	Revenue Administration and Land Records ..	149
5.	The Cultivator	151
6.	The Agricultural Department	157
7.	The Veterinary Department	164
8.	Irrigation	166
9.	Forestry in relation to Agriculture	169
10.	General Education	171
11.	Co-operation	172
12.	Communications and Marketing	174
13.	Local Self-Government	181
14.	Public Health and Sanitation	182
	MAP .. .. .. *facing page*	140
	GRAPH .. .. .. *facing page*	141

THE CENTRAL PROVINCES AND BERAR

1.	General Features and Natural Divisions	185
2.	Provincial Income and Expenditure	188
3.	Revenue Administration and Land Records ..	192
4.	The Cultivator	193
5.	The Agricultural Department	196
6.	The Veterinary Department	207
7.	Irrigation	208
8.	Forestry in relation to Agriculture	211
9.	General Education	212
10.	Co-operation	214
11.	Communications and Marketing	215
12.	Local Self-Government	216
13.	Public Health and Sanitation	218
	MAP .. .. .. *facing page*	185
	GRAPH .. .. .. *facing page*	186

MADRAS

		Page
1.	General Features and Natural Divisions	219
2.	Provincial Income and Expenditure	224
3.	Revenue Administration and Land Records ..	228
4.	The Cultivator	231
5.	The Agricultural Department	239
6.	The Veterinary Department	253
7.	Irrigation	255
8.	Forestry in relation to Agriculture	258
9.	General Education	259
10.	Co-operation	261
11.	Communications and Marketing	266
12.	Local Self-Government	270
13.	Public Health and Sanitation	271
	MAP .. .. .. *facing page*	219
	GRAPH .. .. .. *facing page*	222

NORTH-WEST FRONTIER PROVINCE

1.	General Features and Natural Divisions	275
2.	The Land and the People of the five settled districts :—	
	(*a*) Hazara	276
	(*b*) Peshawar	278
	(*c*) Kohat	281
	(*d*) Bannu	283
	(*e*) Dera Ismail Khan	284
3.	Departmental Activities	286
4.	The Tribal Territory and its Problem	288
	MAP .. .. .. *facing page*	275
	GRAPH .. .. .. *facing page*	276

THE PUNJAB

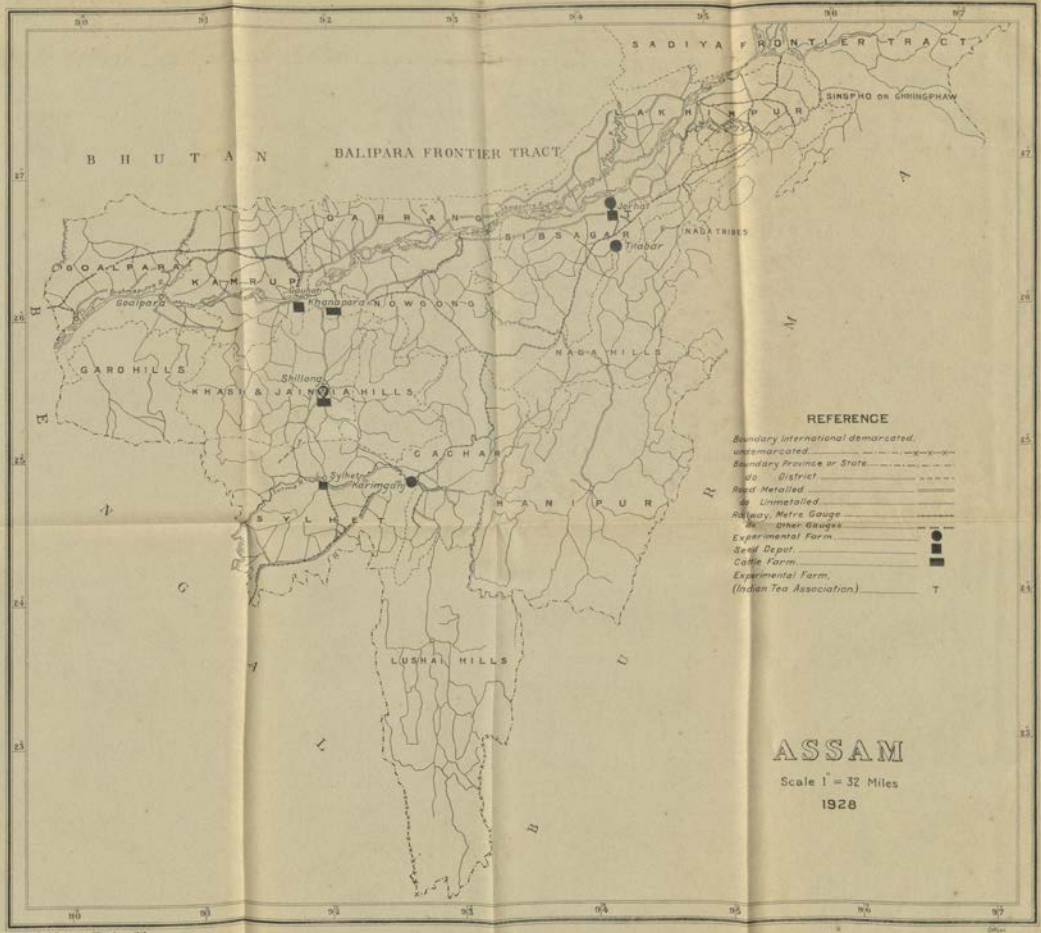
		Page
1.	General Features	291
2.	Natural Divisions	293
3.	Provincial Income and Expenditure	295
4.	Revenue Administration and Land Records ..	298
5.	The Cultivator	301
6.	The Agricultural Department	308
7.	Irrigation	322
8.	Forestry in relation to Agriculture	332
9.	General Education	333
10.	Co-operation	339
11.	Communications and Marketing	348
12.	Local Self-Government	354
13.	Public Health and Sanitation	355
	Map .. .. .. *facing page*	291
	Graph .. .. .. *facing page*	292

SIND

1.	General Features	359
2.	Provincial Income and Expenditure	362
3.	Revenue Administration and Land Records ..	364
4.	The Cultivator	365
5.	The Agricultural Department	366
6.	The Veterinary Department	369
7.	Irrigation	370
8.	Forestry in relation to Agriculture	372
9.	General Education	372
10.	Co-operation	373
11.	Communications and Marketing	376
12.	Local Self-Government	377
13.	Public Health and Sanitation	378
	Map .. .. .. *facing page*	359
	Graph .. .. .. *facing page*	360

THE UNITED PROVINCES

		Page
1.	General Features	379
2.	Natural Divisions	382
3.	Provincial Income and Expenditure	386
4.	Revenue Administration and Land Records ..	392
5.	The Cultivator	395
6.	The Agricultural Department	400
7.	Irrigation	407
8.	Forestry in relation to Agriculture	412
9.	General Education	414
10.	Co-operation	417
11.	Communications and Marketing	419
12.	Local Self-Government	421
13.	Public Health and Sanitation	422
	Map .. .. .. *facing page*	379
	Graph .. .. .. *facing page*	381
Glossary	.. ..	427



SADIYA FRONTIER TRACT
SINGPHO OR CHHINGPHAW
LAKHIMPUR
BHUTAN
BALIPARA FRONTIER TRACT
GARRANG
SIBSAGAR
Jorhat
Titabar
NAGA TRIBES
GOALPARA
KAMRUP
Goalpara
Gauhati
Khanapara
NOWGONG
NAGA HILLS
GARO HILLS
KHASI & JAINTIA HILLS
Shillong
CACHAR
Sylhet
Karimganj
SYLHET
HANIPUR
LUSHAI HILLS
BENGAL
BURMA
REFERENCE
Boundary International demarcated, undemarcated
Boundary Province or State
do District
Road Metalled
do Unmetalled
Railway, Metre Gauge
do Other Gauges
Experimental Farm
Seed Depot
Cattle Farm
Experimental Farm, (Indian Tea Association)
T
ASSAM
Scale 1" = 32 Miles
1928

PREFACES TO THE PROVINCIAL VOLUMES OF EVIDENCE.

ASSAM

1. GENERAL FEATURES.

The Province of Assam, ceded to the British by the Burmese in 1876, was administered as part of Bengal until 1874 when it was formed into a separate province under a Chief Commissioner. It was merged into Eastern Bengal in 1905 but again became a separate province in 1912. Including the area occupied by the hill tribes under the political surveillance of its Government, it covers some 77,000 square miles. The area under regular administration is about 53,000 square miles; thus the territory to which this introduction refers is nearly as large as England and Wales. The present population is about 8,500,000. The inhabitants are very unequally distributed; the density of the population in some tracts may be as much as 500, in others there are no more than 7 persons to the square mile. About eighty-eight per cent of the people are dependent on agriculture, and there are only six towns with more than 10,000 inhabitants, of which the largest is Shillong with a population of about 17,000.

Roughly conical in outline, its northern base bedded on the Himalayan mountains which rise steeply and to great heights above the broad valley of the Brahmaputra, its southern apex the Lushai Hills, wedged between the Chittagong hills of Bengal and the Chin hills of Burma, the Province of Assam, though the smallest in cultivated area and in population among the major provinces of India, may claim to rival any of them in interest. It includes within its borders a variety of peoples and languages, and a wealth of natural gifts that make an immediate appeal to the traveller, and dispose him to accept, despite the objections of philologists, the conventional derivation of the name of the province from the Sanskrit *asama* or 'peerless'.

Whence come the people of Assam? Its large immigrant population makes this a sufficiently complicated subject for modern census commissioners to unravel. Whence they came in the far distant past, none can say. Immigration into its fertile valleys is much older than history. The earliest people to whom legend permits the use of the term "immigrant" were Aryan priests and warriors; and they found, settled along the banks of the Brahmaputra, tribes of Mongolian affinity, and in the Surma Valley people of Dravidian type. Here, in this north-eastern corner of India, centuries before any written records were made, three of the world's great races met and fused. When, in the seventh century of the Christian era, a Chinese traveller first provides a description of the people, he tells of a small but sturdy dark yellow race, fierce of countenance, but upright and—be it noted—studious, learning the tenets of a new religion from the Brahmins. In the centuries that followed, Koch kings from the west, Ahoms from the east, Muhammadans from the south and Himalayan hill

men from the north struggled for the possession of these fertile valleys. The broad alluvial plains of the Brahmaputra and Surma preserve ruined records of these struggles. The character and customs of the people themselves disclose their diverse origin. But yet throughout these troubled centuries there existed human sanctuaries within Assam. The thick jungles of the lower hills repelled invaders, and in the uplands there dwelt apart tribes who have preserved their purity of race and have retained their ancient languages and customs. To the Sema Nagas, who visited Jorhat so that their food difficulties might be explained to the Commission, the seventh century description of the Chinese traveller could have been applied with little need for modification. They had not embraced the Hindu religion but, otherwise, they were, as were their predecessors thirteen centuries before, small of stature, sturdy, dark yellow skinned and fierce of countenance. They gave no indications of being studious (indeed schools were regarded by them as somewhat of an infliction) but they were certainly intelligent. To the ethnologist Assam offers a field of enquiry unequalled elsewhere in India, and it is a fortunate circumstance that the province has found competent students of this subject. The daily programme of a Royal Commission, though it offers no opportunity for independent study of the peoples met with, permits some realisation of the opportunities that exist for others, just as it permits glimpses of the wonderful natural setting in which these types of mankind have been evolved. And this natural setting may occupy our attention for a moment, for the agriculture of Assam is everywhere conditioned by the physical features of the country.

The province is entered from the north-west by the Eastern Bengal Railway. The line traverses the administrative districts of Goalpara and Kamrup which are bounded on the north by the Himalayan State of Bhutan and on the south by the Brahmaputra. These two districts occupy a wide alluvial plain intersected by rivers of large size which, debouching from the mountains and crossing the plain, lose themselves in the giant Brahmaputra. But the Eastern Bengal Railway follows an artificial avenue; the natural gateway to Assam is reached on the Brahmaputra. No Indian province, not the western presidency with its Bombay harbour, modern sea gateway to India, not the North-West Frontier Province, with its rugged Khyber, ancient land gateway to the plains of Hindustan, can raise higher anticipations in the traveller approaching it for the first time than does Assam when entered by the river gateway by which its former capital of Gauhati and its present capital of Shillong are reached. The visitor, who quits the railway to cross the Brahmaputra while the sun struggles for supremacy with the mists on the river, and sets his course for the blue Khasi Hills, serrated in outline and rising tier upon tier above the river's southern bank, enters this province by a gateway that compels expectation. Nor is he disappointed. Assam cannot, and does not, boast of its road system, but few roads can traverse so varied a country as does the road which the traveller may now follow southwards for 100 miles. From the Brahmaputra plain it rises to over 5,000 feet; from its start

near Gauhati, with a rainfall of between 60 to 70 inches, it leads to Cherrapunji, where falls varying from 350 to 900 inches have been recorded. The alluvium of the valley is soon exchanged for the rugged gneiss of the hill sides, and when the hill is climbed, the highway for many miles traverses a changing upland country showing harsh metamorphosed sandstones, castellated trap rocks, rich, easily weathered limestones and surface seams of coal, each of which confers characteristic features on the landscape and vegetation.

2. NATURAL DIVISIONS.

This Gauhati-Cherrapunji road may conveniently form the starting point for a reference to the natural divisions of Assam, for it begins in the Brahmaputra Valley, one great natural division; in its course, it traverses à district typical of the many hill tracts of the province, and it terminates on the edge of an escarpment, from which one may see, 4,000 feet below, the great Surma Valley, which stretches for miles in a north-easterly and south-westerly direction and forms the third of the great natural divisions of Assam. The valley of the Brahmaputra is an alluvial plain running roughly east and west for a distance of 450 miles, and covering an area of nearly 25,000 square miles. On the north, it is shut in by the Himalayas and, on the south, by the elevated plateau known as the Assam Range. In general, the valley is about fifty miles broad, but, here and there, spurs from the Assam Range run right down to the river, and about the centre of the valley there is the isolated block of the Mikir Hills. It is only in such places where the hills force the river to keep to a definite channel that the traveller up the Brahmaputra can see any signs of towns or large villages. Elsewhere, the river, by constantly changing its course, has appropriated to itself a belt of land extending perhaps to as much as half a dozen miles on either side of the stream. This *chipari* land, as it is called, is in the main a wilderness of marsh and grassy jungle, interspersed with patches of mustard and broadcast paddy brought under fluctuating cultivation by immigrants from eastern Bengal. Further inland, on either side of the river, there is a belt of low-lying level in which long-stemmed paddy is grown. Thereafter comes a zone of higher and more thickly populated land, where there is still much grassy jungle and forest but where there is also a considerable amount of permanent cultivation, mainly transplanted rice. Further inland, towards the hills on either side, the population becomes more scanty and cultivation begins to give way to extensive forests and grass savannahs. Transplanted rice is grown on fields irrigated from hill streams, and tea on the high flats and hill slopes.

The valley of the Surma, at any rate that part of it which falls within the Province of Assam, is small in comparison with that of the Brahmaputra, covering only 7,247 square miles. To the north, and rising in an abrupt wall 4,000 feet high, stands the plateau of the Khasi and Jaintia Hills, and further east the angular and serrated range of the Barrail or "Great Dyke." Enclosing the valley on its eastern border are the parallel ridges of the mountains of Manipur, while, on the south, similar parallel ridges belonging to the same system

extend from the Lushai Hills, and from the Tippera Hills in Bengal, for some distance into the plain. The physical conformation of the Surma Valley differs in many respects from that of the Brahmaputra Valley. The reason is that throughout its course in Assam, the Brahmaputra is a comparatively swift moving river flowing between sandy banks which it is continually making and unmaking. The rate of flow of the Surma and its tributaries is slow by comparison and they deposit large quantities of silt every year, with the result that the highest lands in the delta proper lie nearest the river banks and it is there that the soil is most fertile and the population densest. From the river banks the surface slopes backward into great hollows or *haors*, many of which hold some water all the year round and all of which become extensive lakes during the flood season. So low, indeed, is the general level of the western Sylhet portion of the valley that the flood water reaches right up to the foot of the hill ranges and the only dry spots are the artificially raised sites on the river margins, on which the villages are built. Conditions are less unfavourable in eastern Sylhet and Cachar where the level monotony of the plain is broken by ridges which extend inwards from the hills to the south, and where *tilas* (small isolated hills) are a common feature. In the low-lying tracts, the main crop is *aman* (long-stemmed) rice ; *boro* (spring rice) is grown, in the dry season, on terraced land at the water-edge of the *haors ;* on the *tilas*, or elevated portions, are found not only the village sites but fruit gardens and tea plantations.

The third natural division of the province consists of the Hill Tracts. These do not form one great compact block as does each of the other two natural divisions, but the various tracts are sufficiently similar in their characteristics to be considered together. The northern portion consists of the Assam Range interposed between the two valleys, and the Mikir Hills which project from that range into the Brahmaputra Valley. In the south there are the Lushai Hills and the ridges which run northwards from these and from Tippera into the Surma Valley. The central portion of the Assam Range consists of a table land at an elevation of nearly 6,000 feet, but on the east and west it becomes broken up into sharply serrated ridges where hill and valley alike are covered with forests. Great stretches of the central plateau consist of undulating grassy hills with occasional groves of pine and oak. The Lushai Hills in the south, which divide Burma from Assam and run at right angles to the Assam range, harbour a scanty population, being for the most part covered with dense bamboo jungle and rank undergrowth.

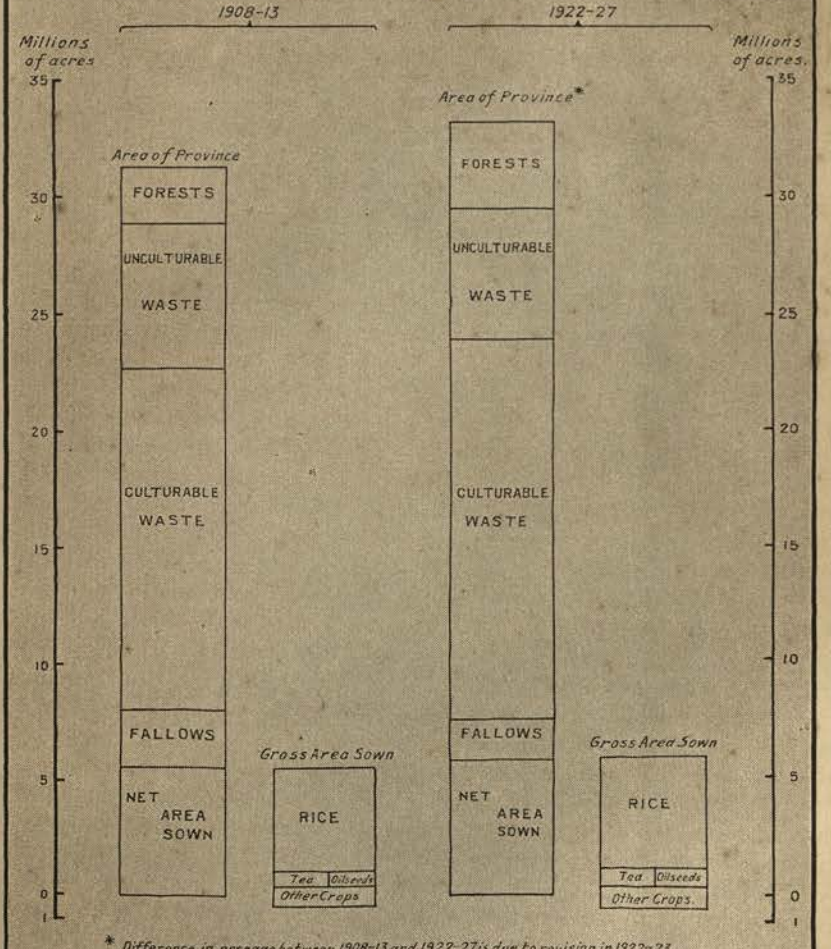
Most of the cultivation in the Hill Tracts is done on the *jhum* system. The jungle is cleared with axe and fire, and the seed of hill rice, millets, cotton, potatoes and vegetables is dibbled in among the ashes. A plot is cultivated for two or three years in succession, then allowed to relapse into jungle again for a period varying from three to eight or ten years or more, according to whether land is scarce or plentiful. The best farmers are the Khasis who grow their rice in terraced and carefully irrigated fields in the shallow valleys which are common in the central

ASSAM

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 Year Averages)

NOTE. The difference between the Gross Area Sown and the Net Area Sown represents the area sown more than once.



* Difference in acreage between 1908-13 and 1922-27 is due to revision in 1922-23 by the Director of Surveys.

To face page 5

plateau. Terracing for rice is also resorted to by the Angami Nagas under much more difficult conditions which require stone retaining walls instead of earthen dykes, and to a limited extent, also, by the Sema Nagas and other tribes. Other interesting features of Khasi cultivation are the introduction and rapid expansion of potato growing and the betel and orange groves and pineapple gardens which flourish on the hills and slopes facing Sylhet.

The total area classed as 'culturable' in the province, excluding States and tribal areas, is 23,543,871 acres, out of which only 6,014,317 acres were under crop in 1926-27. The areas under the principal crops in that year were—

Rice	4,685,228 acres.
Tea	420,664 ,,
Fruits, vegetables and root crops	472,050 ,,
Rape and mustard	365,361 ,,
Jute	186,058 ,,
Sugarcane	40,037 ,,

Tea occupies a very important place in the agriculture of Assam, not only on account of the area grown, but also because of the high value of the product. It is cultivated in all the plains districts, but more especially in the Sibsagar, Lakhimpur and Darrang districts in the Assam Valley, and Sylhet and Cachar in the Surma Valley. Altogether there are over 900 gardens, the outturn from which amounted to 240 million pounds of black tea in 1926, the average outturn per acre being 602 pounds valued, roughly, at 13 annas per pound. The gardens give employment to about half a million permanent labourers who are practically all immigrants from other parts of India. Investigations in connection with the cultivation of tea and its preparation for market are carried out by the Scientific Department of the Indian Tea Association at Tocklai. Towards the cost of this work Government make a contribution of Rs. 10,000 annually.

As may be inferred from its geographical position and natural features, the climate of Assam offers many contrasts. As a whole, coolness and high humidity are the features which distinguish it among Indian climates. Thus, for example, tea plantations, which in south India are found at elevations of 3,500 feet and over, are found on the plains of Assam a few hundred feet above sea level, and at the elevation which the tea plant requires in the south, the varieties of potatoes usually grown in Britain and many other plants common in English gardens flourish in Assam.

The range in rainfall is much more marked than in temperature; it varies from comparatively light falls in parts of the plains to the world's record for average rainfall of about 450 inches at Cherrapunji.

3. PROVINCIAL INCOME AND EXPENDITURE.

The introduction of the Reforms brought about a complete change in the financial relations between the central and provincial governments. Provincial governments had, up to that time, no separate revenues of their own, their resources being mainly obtained from a share of divided heads

of revenue and from lump assignments from Imperial revenues. With the advent of the Reforms, however, definite sources of revenue were allocated to the provincial governments and there was a complete separation between the revenues and expenditure of the central and provincial governments. In addition, the expenditure on leave allowances and pensions incurred in England, which used to be met by the central Government, became a charge on the provincial governments.

The province started, in 1921-22, with an opening balance of Rs. 32 lakhs and it was anticipated that the prosperity that followed the war would continue and that the year would close with a balance of Rs. 43 lakhs. The wave of depression, however, which swept not only over India but over the world in that year severely affected the finances of the province with the result that the closing balance was only Rs. 6½ lakhs. This serious state of affairs continued during the year 1922-23 and it was necessary for the province to borrow a sum of Rs. 13 lakhs from the Government of India to enable it to meet obligatory expenditure. The strictest economy was enforced and, in 1923-24, retrenchment in every possible direction effected recurring savings to the extent of Rs. 11 lakhs. The Legislative Council also agreed, in 1922-23, to the raising of the fees under the Stamp and Court Fees Acts for a period of three years, bringing in an extra revenue of Rs. 3 lakhs per annum. These Acts were extended for a further period of three years which ends on the 30th April, 1928, and the Council will shortly be asked to make the enhanced fees permanent. Registration fees were also permanently raised in 1923 and resulted in an increase of half a lakh of rupees per annum. The subvention from the central Government towards the cost of maintenance of the Assam Rifles was increased from Rs. 14 to Rs. 16 lakhs in 1923-24, with retrospective effect from 1921-22. The opening of the Goalpara tram line also had an appreciable effect on the forest revenue.

All these measures enabled the province to tide over the crisis and, with the turn of the tide in 1924-25, it was possible to repay the loan taken from the central Government and to make a beginning on the expansion of activities in the nation building departments. In 1925-26, the temporary remission of Rs. 6 lakhs in the contribution to the central Government enabled further allotments to be made for expenditure on transferred departments. Remission of the full contribution of Rs. 15 lakhs in 1927-28 (of which Rs. 8 lakhs was permanent), coupled with an increase in land revenue as a result of resettlement operations in certain districts, has enabled further progress to be made and has also permitted the gradual restoration of the economies effected in 1923-24. From 1928-29 the provincial contribution has been finally and completely remitted.

REVENUE AND EXPENDITURE CHARGED TO REVENUE

GOVERNMENT
(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue	96	92	1,03	1,05	1,07	1,07
Excise	60	54	60	66	74	72
Stamps	15	18	20	21	22	23½
Forests	13	17	20	25	30	31½
Other heads	5	3	6	7	8	7
Railways	—0½	..	..	..	..	..
Irrigation	..	..	..	..	..	..
Interest Receipts	0½	1	1	1	1	1
Civil Administration—						
Administration of Justice	1	2	2	2	2	2
Jails and Convict Settlements ..	1	1	1	1	1	1
Police	1	3	1	3	2	2
Education	2	2	2	2½	2	2½
Medical	..	..	..	0½	..	..
Public Health	1	1	1	0½	1	1
Agriculture (including Co-operation and Veterinary) ..	..	..	..	..	..	..
Industries	..	..	..	..	..	..
Other departments	0½	..	2	..	1	..
Civil Works	3	4½	4	5½	4½	4½
Miscellaneous	1½	1	3	5	3½	3½
Miscellaneous adjustments between Central and Provincial Governments ..	..	..	..	0½	..	..
Total, Revenue Receipts ..	2,00	1,99½	2,26	2,45½	2,59	2,58½

Capital Receipts

Capital Receipts						
Revenue Surplus	..	..	21	30	22	0½
Famine Insurance Fund	..	..	..	..	..	..
Loans and advances by Provincial Governments ..	2	4	4	5	1	1½
Loans between Central and Provincial Governments	..	13	..	..	..	..
Advances from Provincial Loans Fund ..	..	..	..	..	..	..
Total, Capital Receipts ..	2	17	25	35	23	2
Opening Balance ..	32	6½	..	23	44	65
Total ..	34	23½	25	58	67	67

OF ASSAM

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue	13	15	16	16	17	18
Forests	10	11	11	14	15	14
Other heads	5	4	5	4	17	13½
Capital outlay on Forests	..	..	..	..	1	1
Railways	1½	1	1	1	1	0½
Irrigation—Revenue Account	1½	0½	1	1	1	1
Irrigation—Capital Account charged to Revenue.	..	..	..	..	..	..
Debt Services Interest	−0½	−0½	1	−1	−1	−1
Civil Administration—						
General Administration	28	27	28	26	27	27½
Administration of Justice	7	9	8	9	9	9
Jails and Convict Settlements ..	5	5	5	4	4	5
Police	29	31	18	22	24	26
Education	23½	23	23	24	25	27
Medical	10	10	10	10	11	11½
Public Health	6½	5	5	5	10	10
Agriculture (including Co-operation and Veterinary) ..	5	4	4	4	5	5
Industries	1	1	1	1	1	1½
Other departments	1	2	..	2	2	1½
Civil Works	43	41	38	38	40	50
Miscellaneous	16	16½	15	20½	19	22
Miscellaneous adjustments between Central and Provincial Governments ..	..	..	..	..	..	..
Provincial Contribution	15	15	15	15	9	15
Assignments to the Central Government ..	3	..	..	..	..	..
Total, Expenditure charged to Revenue ..	2,23½	2,20½	2,05	2,15½	2,37	2,58

and Expenditure

Capital Expenditure						
Revenue Deficit	23½	21	..	..	..	..
Forest, Irrigation, and other Capital outlay not charged to Revenue.	..	1½	1	1	..	2
Famine Insurance Fund	..	..	..	..	..	..
Loans and advances by Provincial Governments ..	4	1	1	1	2	1½
Loans between Central and Provincial Governments ..	..	..	..	12	..	..
Provincial Loans Fund	..	..	..	..	..	..
Total, Capital Expenditure ..	27½	23½	2	14	2	3½
Closing Balance ..	6½	..	23	44	65	63½
Total ..	34	23½	25	58	67	67

4. REVENUE ADMINISTRATION AND LAND RECORDS.

It is a difficult matter within the limits of space here permissible to convey to the reader any useful account of the land revenue systems which history and natural features have imposed on successive generations of administrators in Assam. In general, the earlier collectors of revenue were faced with the problem of getting what they could from any particular locality; and the arrangements they made were of a kind which left their successors much scope for ingenuity in giving the revenue administration some degree of system and uniformity in its modes of assessment and methods of collection. Sometimes, indeed, those successors were left no choice; for, following the Bengal lead, permanent settlements had been effected at an early stage of British occupation. Thus, in the important district of Goalpara, about two-thirds of the land was permanently settled by the representatives of the East India Company for a sum of Rs. 11,411 annually; which works out at less than one rupee per 100 acres. The foundation for this bargain was laid by the Moghuls who, being unable to subdue the district, were content to take what was offered and payment was made in kind. "Kind" was converted into "cash" by the British about 1793, at the figure above mentioned. Moghul revenue collectors were more successful in the rich and populous district of Sylhet. Here, towards the end of the sixteenth century, they are said to have derived a revenue of about Rs. 1½ lakhs, and when a permanent settlement was made some two centuries later, their British successors fixed a payment of Rs. 3¼ lakhs on about 1,350,000 acres of land, or Rs. 24 per 100 acres.

In Cachar, the basis of the early settlements had been laid down by the Kachari Rajas who, whatever the principles were on which they ruled, believed in communism between those from whom they extracted revenue. Occupiers of land were grouped territorially into communities or *khels* having nothing in common in race or religion, but sharing an unlimited liability to contribute to the sum due from their *khel* until the Raja's demand was satisfied. The *khel* system too was taken over by the British, and revenue continued to be levied from communities until the end of the nineteenth century, when the land was classified in accordance with modern methods.

Natural conditions, like history, raised difficult questions for the early settlement officers of Assam. It was not merely that the soil varied as it does in other Indian provinces, but, in the Brahmaputra Valley, there was much good culturable land lying waste so that the peasant dissatisfied with his acres, or his land tax, could easily abandon his holding and go in search of better conditions elsewhere. Thus, when land had been surveyed and the assessment fixed, it by no means followed that a village, or group of villages, would yield their estimated revenue even in good years, for a substantial percentage of the area included as cultivated might be relinquished. Again, in the hilly districts, occupied largely by the tribes practising *jhum* cultivation and shifting from place to place at intervals of a few years, special and varying methods of raising land revenue were called for.

A century's experience has now been codified in the Fourth (1921) Edition of the Assam Land Revenue Manual, which sets out the law governing the subject. The Manual contains the "Assam Land and Revenue Regulation, 1886," the rules made under the Regulation for settlement, survey, registration of title and other matters engaging the attention of revenue officers; and also the "Assam Local Rates Regulation, 1879" defining the measures to be taken for raising local rates and meeting expenses incurred for the prevention and relief of famine in different parts of the province.

Outside the permanently settled and hill districts, the ordinary Assamese ryot holds on an annual tenure or a decennial lease. The lease confers a right to possession on re-settlement and a heritable and transferable title; the tenant is not bound to retain possession for the term of his lease, but may relinquish at any time on giving the prescribed notice to the local revenue officer. The annual tenant has in theory no right to retain his land beyond the year for which he has taken it, but, in practice, so long as he pays his taxes he is not disturbed. A cultivator may enter on, and cultivate, any unoccupied waste land without notice, provided he pays the revenue demand; and, if he makes an application for the waste, he can secure a title to possession after a fresh settlement of the village has been made. In some districts, the practice of entering on waste land is very common and much of the time of local revenue officers is spent in surveying newly reclaimed land and issuing leases to applicants for possession.

Early in the present century, the system of revenue settlement common in many other parts of India was introduced into Assam and the quality of the land held by a cultivator was taken into account in fixing his land revenue. These revised settlements are now in progress. This system took the place of a more summary system under which land was merely classified under the three heads, homsteads, transplanted rice lands and other lands.

In the late "thirties" of the nineteenth century, the revenue authorities in Assam were called upon to deal with a land question of a novel kind. The discovery that good tea could be grown in the province led to applications for land by companies and private planters. Special rules, the first of which were issued in 1838, were framed for those desiring to take up the new industry. At first, grants of land were offered in the Brahmaputra Valley on condition that one-fourth of the area taken up should remain revenue-free in perpetuity; the remaining three-fourths became subject to revenue after from five to twenty years according to the amount of reclamation called for. In 1854, these rules underwent some modification and they were extended to the Surma Valley; but soon afterwards, in 1862, new regulations provided for the acquisition of land by tea planters in fee-simple, and land was sold free of revenue demand at rates varying from Rs. 2-8 to Rs. 10 per acre. Advantage of this offer was taken by most of those engaged in tea cultivation and about 330,000 acres became private property, free from the future demands of the revenue officer. In 1876, the rules were again altered and those requiring land for tea are

now charged Re. 1 per acre for the concession of a 30-year lease. For two years, the land is held free of revenue and thereafter the rates rise to 8 annas per acre in the eleventh and Re. 1 in the twenty-first year. After the lease expires, a reassessment is made.

In the Brahmaputra Valley, the special terms above referred to were intended for persons engaging in the tea industry, and land could only be acquired for tea if it was not needed for growing food crops; but in Cachar, waste land could be acquired on similar special terms for ordinary cultivation. The rules governing the concessions varied, but leases for from twenty to thirty years, with freedom from revenue for two or three years, were usual.

Throughout the hill districts of Assam, the revenue is not assessed on the quantity of land, but on each house occupied. A usual rate is Rs. 2 to Rs. 3 per house.

Outside the hill districts, the province is divided into two commissioners' divisions for revenue, as for other administrative purposes. The populous Surma Valley is composed of two, and the Assam Valley of six, districts, each in charge of a Deputy Commissioner with the duties of the Collector and Magistrate of other provinces; and, as elsewhere, the Deputy Commissioner is assisted by members of the Indian and Provincial civil services. Outside the civil services there is, in the temporarily settled districts, a group of men occupying an intermediate position, in that they are not regularly salaried officers, but are paid as revenue collectors on a commission basis. They are known as *mauzadars*; each has charge of a *mauza*, or small group of villages. To the people they represent the Government, to the Government the people. They are a survival of an old form of agency for revenue collection. Originally the *mauzadar* was a petty revenue farmer, who contracted to pay over the revenue due by his *mauza;* so long as he paid up a fixed sum, he could keep the balance of the money he extracted for himself. This was obviously an undesirable method of revenue collection, and it was replaced by a system under which an annual settlement was made with the *mauzadar* and he was paid by a commission sufficiently liberal to satisfy him and to cover his bad debts.

Some years ago, an attempt was made to abolish the *mauzadar* system, and to substitute salaried tahsildars responsible for revenue collection in groups of *mauzas* forming a tahsil. But under Assamese conditions, it was found that this ordinary Indian method was a doubtful benefit, and *mauzadars* have been restored in some of the areas from which they had been displaced by salaried officers.

The appointment and dismissal of *mauzadars* rest with the Deputy Commissioner of the district, subject to the Commissioner's approval. On the death of a *mauzadar*, the claims of members of his family to the succession are first considered, and a son, if he has the requisite qualifications of character and education, is appointed. If no member of the family is suitable, some other person of the same race as the majority of the population of the *mauza* is chosen; for it is important that this officer should be a man of the people. As a rule, the *mauzadar* is required to reside in

his *mauza*. Apart from the collection of revenue, he is entrusted with numerous duties of the kind performed by naib-tahsildars elsewhere; such as the supervision of village headmen, the submission of weekly crop reports and of monthly vital statistics. He must also report persons who allow their cattle to trespass, or who encroach on roadside lands, must receive applications for waste land, issue forest permits and assist in assessing income-tax. He is thus not merely a revenue farmer, but a responsible local person entrusted with the charge and welfare of his *mauza*, and paid by results when he produces the proceeds of revenue collections. The *mauzadar* on the plains corresponds to the petty chiefs, characteristic, under both ancient and modern administrations, of the hills of Assam.

In five of the districts of the Upper Brahmaputra Valley, there are village headmen, as in most Indian villages. In Assam, they are known as *gaonburas*: they are the "elders and spokesmen" of their people, and they are expected to act as leaders in carrying out works for local benefit. The repairing of wells, the fencing of public tanks, the maintenance of rights of way, the condition of the village school room, are all matters for the *gaonbura*. He has also the oversight of affairs that his fellow-villagers may regard as benefiting the Government rather than the village, for he must assist the *mauzadar* to collect revenues, and he helps the police by reporting when criminal matters crop up. For these duties he is entitled to some remission on his own land revenue, but the maximum remission is Rs. 8; so that the village elder of Assam must look to the dignity of his office, rather than to the direct emoluments, for his reward.

Land Records and Survey.—For the purpose of land records and survey the province may be divided into three sections:

(1) The hill districts;

(2) The temporarily settled areas;

(3) The permanently settled areas.

In the hill districts, the rights in land have not generally reached a stage which requires a cadastral survey and no such survey has as yet been undertaken.

In the temporarily settled areas, the survey of cultivated lands is practically complete and, as cultivation spreads in these areas, the cadastral survey keeps pace with the extension.

No survey of the permanently settled areas has, as yet, been made. Power exists under section 27 of the Assam Land and Revenue Regulation for the recovery from proprietors and landholders of the cost of survey and of erecting and repairing boundary marks. But the main object of such a survey is to prepare a record of rights and no power at present exists for the recovery from the proprietors and landholders of the cost of preparing the record. An experimental survey conducted in the district of Sylhet, between 1914 and 1918, showed that the cost of preparing a general record of rights would impose an unduly heavy burden on

provincial revenues. An attempt to obtain the necessary power to recover the cost from the proprietors and landholders was made but the Legislative Council rejected the measure.

5. THE CULTIVATOR.

The total population of the British Territory of Assam in 1921 was 7,606,230 of whom 7,428,085, or 97·7 per cent, who lived in 30,957 villages, were classed as rural; the remainder of the people lived in 28 towns, most of them of small size. Only thirteen of these towns had a population exceeding 5,000. Conditions vary widely within the three natural divisions. In the Brahmaputra Valley, the most densely populated district is Kamrup with 197 persons to the square mile, whilst, in the district of Balipara, only seven persons per square mile are found. The density of population in the Surma Valley is thrice that in the Brahmaputra. In the district of Sylhet there are 472, and, in the plains part of the Cachar district, 269 persons to the square mile.

The most densely populated area in the province is the subdivision of Habiganj in the district of Sylhet with 545 persons to the square mile.

The hill tracts are sparsely and unevenly peopled; only at the headquarters of the administration in Shillong, which has 17,700 inhabitants, is there any considerable density of population.

As contrasted with the state of affairs in most parts of India, the boundaries of Assamese villages are often ill-defined. Detached hamlets and cottages are a common feature.

The wealth of racial admixture which has gone to the formation of the present day cultivators of the plains of Assam, favoured as the country is by good soils, and in most parts by a reasonably good climate for crop growing, should, by a process of natural selection, have thrown up groups of husbandmen who might have been expected to compete in skill with the Arains and Jats of the Punjab or the Kunbis of Gujarat. But Assamese history has not been of a kind that stimulated the peasants of the plains. Even when they satisfied the demands of their Rajas, their crops were never secure from the attention of the blackmailers of the hills; and British protection has not long enough been available to allow of the emergence of agricultural talent, unless indeed it be among the small caste of Baruis or betel vine growers of the Surma Valley.

Apart from race and history, two circumstances may be noted as explaining the lack of agricultural achievement. In the Upper Brahmaputra Valley, land is, or was until recently, abundant, and communications are poor. Until tea gardens provided a local market, there was little stimulus to enterprise. A cultivator grew what was required to feed his household and to pay the revenue collector; and if it is asked "what more was required?" the answer is that he neglected to provide for his cattle, as he might have done; for he was not faced with the great difficulty in finding food for them that confronted the peasants of Lower Bengal. The second circumstance

is one over which the cultivator himself has no control. The people of the submontane tract of the Goalpara district, known as the Duars, work in a notably unhealthy tract where vitality is low. The cultivators of the Surma Valley, too, experience a peculiarly relaxing climate ; and they at least can claim that under difficult circumstances they do contrive to grow reasonably good crops of rice.

The hills of Assam are occupied by races many of whom are not, and do not aspire to be, cultivators ; but these hillmen, when they do settle down to crop-growing, show enterprise and skill. Potato cultivation is carried on extensively by the Khasis, and they show much intelligence in laying out and preparing the land for this crop in places, however difficult of access, where the rock has a fair covering of soil.

At the census of 1921, slightly under half a million people, or 6·2 per cent of the total population, were shown as literate, that is, as being able to write a letter and read the answer to it. The proportion of literates is low compared with that in the neighbouring provinces of Burma and Bengal, but the percentage compares favourably with the figure of 4·7 recorded at the previous census. General education is dealt with in the section on that subject.

6. THE AGRICULTURAL DEPARTMENT.

The history of the "Agricultural Department in Assam" dates back to 1882. In the early days, the department was concerned mainly with the organisation and maintenance of village land records but it made at least one solid contribution to agriculture by starting an investigation which ultimately led to the introduction of exotic potatoes in the Khasi Hills. That other lines of investigation failed to produce any very abiding result is not surprising in view of the fact that the department had neither any experimental farm of its own, nor any agricultural expert to plan and supervise the experiments. A graduate in agriculture was appointed Assistant Director in 1897 and the Upper Shillong experimental farm was opened in the same year. Land records, however, continued to be the main concern of the department until 1907 when, as a result of the constitution of the new province of Eastern Bengal and Assam, a separate Department of Agriculture was created with a civilian Director of its own. Between 1907 and 1911 several experts were recruited so that, at the latter date, the staff consisted of two deputy directors, a fibre expert, a chemist, a botanist, three superintendents of agriculture, an entomological collector and a mycological collector. The rapid progress made during these years met with a serious check as a result of the annulment of the partition of Bengal and the reconstitution of the Province of Assam in 1912. Along with the districts which were handed back to Bengal went the economic botanist, the fibre expert, the three superintendents of agriculture and the two collectors, and the department was again combined with that of Land Records. Between 1912 and 1921, however, two Imperial Service officers and a number of subordinates were added to the cadre and several stations were opened—an experimental fruit garden at La Chaumiere, a rice farm at Karimganj

and a sugarcane farm in North Kamrup. The sugarcane farm was given up in 1920 and a like fate overtook the fruit garden in 1921. In 1922, the Department of Agriculture was, for the second time, separated from that of Land Records and placed with the departments of Industries and Co-operative Societies under one Director.

What was described as a minimum scheme for the development of the department was submitted, in 1921, by the then Director of Agriculture, and received the general approval of Government, whose intention it was to carry it out over a period of five years subject to the provision of funds by the Legislative Council. The scheme provided for a considerable expansion of staff of all grades and for the opening of several new stations, and would have entailed an expenditure of Rs. 5·5 lakhs as capital cost and Rs. 3·90 lakhs recurring. Unfortunately, a period of financial stringency supervened, with the result that only a fraction of the expansion originally contemplated has been carried out. Twenty-six non-gazetted assistants have been added since 1923, one rice farm was opened in the Upper Assam Valley in 1923, and a cattle breeding farm was established in the same locality in 1927 ; but meanwhile the two Imperial officers had left the service. The average net expenditure on the department is about two lakhs of rupees, or one per cent of the total provincial expenditure. The present gazetted staff consists of a deputy director, an economic botanist and three superintendents ; in the non-gazetted grade there are two botanical assistants, one entomological assistant, one chemical assistant, one mycological assistant, sixteen agricultural inspectors, sixty demonstrators, one fruit inspector and four farm managers. For experimental work there are four stations, at Upper Shillong, Jorhat, Titabar and Karimganj ; and three depôts have been established for seed distribution, at Gauhati, Jorhat and Sylhet. A Development Board has recently been constituted, the membership of which consists of two officers from each of the Agricultural, Co-operative and Industries departments and of non-officials elected by the Legislative Council ; its function is to advise with regard to the activities of the three departments.

The planning and the control of the experimental work on the farms is shared by the economic botanist and the deputy director, the former being responsible for the botanical experiments and the latter for general experiments and farm management. At the Karimganj rice experimental farm, a considerable amount of work has been done on pure line selection with the object of evolving improved strains suitable to the locality, and work on cross-breeding, root systems, water requirements, transpiration and seed testing is in progress. Six improved varieties have been distributed, *viz.*, the *Georgesail*, *Indrasail*, the *latisail* and *murali aus*, *basmati* (fine *aus*) and *birpak* (coarse *asra*). Several hundreds of types are at present under observation, including varieties from other parts of India and from abroad.

The Titabar rice station was opened in 1923 to provide for the needs of the Assam Valley. Here again several hundreds of types have been isolated but the work has not yet reached the stage at which seed can be given out for distribution.

Work on sugarcane has been in progress at the Jorhat farm since 1906. It includes the acclimatisation, testing and selection of varieties, local and exotic, and manurial and rotational experiments. As a result, several varieties of cane have been ascertained to be suited to the needs of the local cultivators, *e.g.*, B 147, B 376, B 3412, J 33 (*a*), D 74 and Co 9. Manurial experiments have indicated the advisability of correcting acidity in high land by the application of lime or wood ash, and the beneficial effects of ploughing in *dhaincha* and cowpea as green manure.

One of the principal objects with which the Upper Shillong farm was started in 1897 was the introduction of superior varieties of potatoes. The extent to which this object has been achieved is abundantly evident in the wide areas which are now under exotic potatoes in the higher plateau of the Khasi Hills. The crop has brought with it many problems which the department is patiently trying to solve; the problem of storage; of combating 'blight'; of eliminating varieties that are susceptible to disease; manurial problems and methods of cultivation; whether to plant whole or cut, large or small, potatoes, etc. The success of the introduction of potato cultivation has brought with it its own peculiar responsibilities. Few crops degenerate so quickly and so completely when left to themselves as does the potato, and, in important potato growing countries, research is ever on the alert to evolve new varieties from seed to replace varieties which are becoming played out. It, therefore, seems worthy of notice that some of the sixteen varieties now being grown for distribution on the Upper Shillong farm were imported as long ago as 1912 and that more than one of the varieties which have achieved a wide distribution, *e.g.*, the Up-to-date, have already faded into comparative obscurity in England. The department is, however, continuing to import new varieties for trial.

Horticultural work is in the charge of the recently appointed fruit inspector. He is now trying to introduce methods of manuring orange orchards, irrigating them during the winter and pruning the trees, besides teaching better methods of picking and packing the fruits for long distance transit by rail. There are several government orchards scattered throughout the province. Orange seedlings and pine-apple suckers are distributed every year from the departmental seed depôts.

A small herd of cattle is maintained at the Upper Shillong farm. Some twenty years ago, the herd consisted of three groups—a group of somewhat obscure origin but believed to be a cross between an English and an Indian breed and known as the Patna-Taylor breed, a second group which was a cross between the above-named and the Khasia cattle, and a third group which consisted of crosses between the Patna-Taylor and the Bhutia cattle. The second and third groups have been discarded. The few bulls produced by the twenty cows which now constitute the herd meet with a ready sale for breeding purposes. On the new breeding farm at Khanapara a herd of pure Sindhi cattle has been established, and a herd of cows from Sonepur in Bihar is being crossed with bulls imported from Rangpur. A few Thar Parkar cows and bulls have also recently been imported.

For district work the province is split up into three divisions, each in the charge of a superintendent, who has a staff of inspectors and demonstrators under him. The superintendents' charges consist of the Upper Assam Valley, the Lower Assam Valley and the Surma Valley. Demonstration work in the Khasi and Jaintia Hills is directly under the deputy director of agriculture, who also exercises general supervision over the superintendents' charges. The department has no demonstration farms, all the demonstrations being done on the cultivator's own fields. Each demonstrator concentrates his energies on five or six groups of villages, each group consisting of one or more villages covering an area of two to three square miles. The main subjects of demonstration are the improved varieties of rice, potatoes, jute and sugarcane, the introduction, where suitable, of crops like pulses, groundnut, *arhar*, cotton, and fodder crops, conservation of the manurial resources of the village, and terracing in the hills and upland valleys. To the actual demonstrations in the field and village are added lectures and exhibitions, and work through honorary correspondents and co-operative societies. Distribution of improved seed, as well as implements and manures is done through the three permanent depôts, and temporary depôts at different centres fed by these permanent depôts, which purchase their stocks out of an annual grant allotted by Government. On an average, the depôts between them distribute 1,150 *maunds* of improved paddy, 2,500 *maunds* of seed potatoes, 100 *maunds* of jute seeds, one lakh of sugarcane setts, 200 cane mills and about 2,000 *maunds* of bonemeal each year. The latter is in considerable demand as a manure for rice in the intensively cultivated terraced fields in the Khasi and Jaintia Hills.

There is no agricultural college in the province. Youths who have been chosen for eventual appointment as demonstrators in the department are given stipends and sent for two years' training to one or other of the experimental farms. Students destined for the Subordinate Agricultural Service are sent to agricultural colleges in other provinces, the local Government concerned being paid a fixed sum for each student trained.

7. THE VETERINARY DEPARTMENT.

The Veterinary Department in Assam is under the administrative control of the Superintendent who is the only Imperial Service officer in the cadre. His staff consists, at present, of four inspectors and sixty-one veterinary assistants in the Subordinate Service, all of whom are graduates of the Bengal Veterinary College. Of veterinary institutions there are six under the control of the department, three hospitals and three dispensaries. Each of these institutions is in the charge of an assistant. The rest of the assistants excluding staff and reserve assistants (about twelve in number), are lent to local boards and are in charge of local board dispensaries of which there are thirty-nine. Financially, the boards are responsible for two-thirds of the assistants' pay, for their travelling allowances, and for the dispensary buildings. Government pay the remainder of the salary, supply instruments and make a

small contribution towards the cost of medicines. Transfers of assistants are arranged by the Superintendent after consulting the wishes of the boards concerned.

The three inspectors in administrative charge of circles are entirely under the control of the Superintendent. Their duties are to supervise the work of the assistants, to make returns to the Superintendent, and to inspect under the Glanders and Farcy Act. Full use is made of the veterinary hospitals and dispensaries by cultivators who are fortunate enough to live within reach of them but such institutions are few and far between and can obviously only deal with but a small part of the work waiting to be done. The vast majority of the cultivators have to depend for veterinary advice on the chance visits of the touring assistants. How heavy are the odds against a cultivator in the Surma Valley getting his sick animal treated can be gauged from the fact that an assistant in that locality is responsible, on the average, for about 137,000 cattle scattered over an area of 1,489 square miles.

The main work of the department is concerned with the combating of contagious diseases by inoculating the healthy, and isolating and treating the sick, animals, treating ordinary ailments at assistants' headquarters, village to village inspections, and lectures to cattle owners. During the year 1926-27, the assistants visited 10,000 villages, performed 42,000 inoculations and 1,600 castrations, and treated 28,000 contagious and 50,000 non-contagious cases. Rinderpest in cattle, which, in each of the years 1925-26 and 1926-27, carried off more than 30,000 animals (more than half the total deaths among all kinds of animals from all contagious diseases), is the most serious problem with which the department has to contend.

Laboratory work consists in the examination of suspected material for contagious diseases and parasitic infection. No staff is available for systematic experimental research but investigations in the treatment of diseases are made as opportunity arises.

Selected students who aspire to enter the department as veterinary assistants are given a stipend of Rs. 20 a month for the three years' course and sent to the Bengal Veterinary College for training. At present, four to six stipends are granted annually by Government. Some difficulty has been experienced in getting the right type of students to come forward but it is expected that the recent slight increase in the initial pay of assistants will improve matters. Stipendiaries are bound by contract to serve in the department for a period of five years after completing their studies.

8. IRRIGATION.

There are no government irrigation works. In the valleys, more damage is done by floods than by lack of water. On the hill slopes, the cultivators, following traditional methods and often displaying great ingenuity, irrigate their rice land terraces from the numerous small streams. The only assistance rendered by Government is to the Sema

Nagas who are being encouraged to exchange shifting or *jhum* cultivation for settled cultivation. So far, two tribesmen have been trained as instructors and are teaching about six villages the art of constructing irrigated terraces for rice cultivation.

9. FORESTRY IN RELATION TO AGRICULTURE.

Of the total area of the province, nearly twenty-seven per cent (20,738 square miles) was under forest in 1927. There are two main classes of forests, *viz.*, reserved forests which have been legally constituted as permanent sources of forest produce, or for other economic reasons, and the unclassed State forests which include all unoccupied government waste lands. In addition to these, there is a small but increasing class consisting of tracts which have been reserved as village forests for the provision of the ordinary petty requirements of the people. The distribution between the three classes is as follows :—

	Sq. Miles.
Reserved forests	6,011
Unclassed State forests	14,675
Village forests	52

In the year 1926-27, 4,101 square miles of forest were closed, and 14,998 square miles were open, to grazing to all animals and 1,587 square miles to all animals except browsers. But, as extensive grazing grounds are available outside the forests, there is little demand for grazing within the forests. Cultivators' cattle are admitted on various terms—at full rates, privileged rates, by right under settlement, and free during the pleasure of Government. Under all four catagories combined, the total number of cows, bullocks and buffaloes admitted was less than 28,000. Although, in certain parts, fuel and timber for local use are obtainable only at a high cost, there is no general dearth of timber for agricultural purposes. All persons who hold land direct from Government are allowed to remove from unclassed forests, free of charge, inferior kinds of timber and other forest produce sufficient for their own requirements. The chief minor products removable under permit are bamboos, canes, reeds and thatching grass, the value of such products removed under free grant in 1926-27 being 2¼ lakhs of rupees. Of direct importance to agriculture, too, is the large amount of timber used by the fourteen sawmills engaged in the manufacture of tea chests, which absorb more than two million cubic feet of timber annually.

The formation of village forests represents an attempt at providing for villages the permanent supply of their forest requirements (fuel and building materials) near at hand. Whether the scheme is going to be a success or not, it is yet too early to say. That hopes are entertained for it, is evident from the fact that new areas are being added yearly, but the Conservator of Forests is of the opinion that the importance of proper management is not yet fully appreciated by the average villager and that more importance is likely to be attached to immediate needs than to the demands of the future.

10. GENERAL EDUCATION.

The total expenditure on education in Assam was Rs. 43·84 lakhs in 1926-27 as compared with Rs. 32·7 lakhs in 1920-21 and Rs. 25·6 lakhs in 1916-17. Of the total expenditure in 1926-27, 58 per cent was met from provincial revenues, 13 per cent from local and municipal funds, 17 per cent from fees and the balance, 12 per cent, from subscriptions and other sources. In 1916-17, provincial revenues supplied only 39 per cent of the expenditure whilst local and municipal funds supplied as much as 30 per cent.

The total number of male scholars at recognised institutions in 1926-27 was 235,742, of whom 183,650 were attending primary schools. Taking the primary school age as from 5 to 10 years and using the 1921 census for that age-period, the proportion of boys of primary school-age attending primary schools of all kinds in 1927 was 28·9 per cent.

The total of the female scholars at recognised institutions in 1926-27 was 34,691, of whom 30,025 were attending primary schools. Calculated in the same way as for male scholars, the proportion of girls of primary school-age attending primary schools in 1927 was 4·84 per cent.

The notable feature of the female education in Assam is that half of the total scholars are receiving their education in schools for boys.

In addition, 17,572 boys and 615 girls were attending unrecognised institutions.

The following Table gives further particulars regarding male education in recognised educational institutions in the province :—

Kind and number of institutions	Number of pupils	Percentage at each kind of institution	Cost per pupil
			Rs.
3 Arts Colleges ..	1,040	0·41	340·8
1 Professional College ..	91	0·04	200·4
45 High Schools ..	15,299	6·06	46·5
300 Middle Schools ..	31,013	12·29	13·7
4,377 Primary Schools ..	199,903	79·19	5·1
155 Special Schools ..	5,074	2·01	35·6
4,881 Total ..	252,420	100·0	10·7

A compulsory Primary Education Act was passed in 1927 under which local authorities may submit schemes for compulsory education in their areas. As the Act was passed so recently as last year, there has been no time to permit of schemes being submitted. The view of the Director of Public Instruction, in the evidence which he gave before us, was that compulsion might be introduced in very limited areas, if local bodies could obtain financial assistance from provincial revenues, but that for the mass of the people the incidental expenses of clothes and school books would be a burden.

There is provision in the province for training the teachers required for primary and middle schools. Teachers for high schools receive their training in Bengal. It has not been found possible to make any official provision for adult education. Night schools for men have been started by the Social Service League and other agencies and assistance has been given by Government.

As the percentage (4·8) of girls of school-going age actually at primary schools shows, female education has as yet made little progress. In the Khasi Hills female education is, thanks to missionary efforts, more advanced than in the plains. The Director of Public Instruction was able to tell us that, though opinion moves very slowly on the subject, yet it does move in the direction of providing education for girls. Ten years ago there was no high school for girls, whereas now there are five such schools, in which, in 1927, over 1,000 pupils were enrolled.

Higher and secondary education for boys is but little developed and there has so far been no attempt to give an agricultural bias to it by providing agricultural classes with farms or school gardens attached. But, in a recent revision of the middle school curriculum, provision was made for various optional courses, of which agriculture would be one, to be instituted if and when a demand arose.

Assam has a special problem in bringing education within reach of the tribes in the Khasi and Jaintia Hills, and the Naga, Garo, Lushai and other hill tracts. Considerable progress has been made in the Khasi and Jaintia and Lushai Hills. Among the Nagas, also, a number of schools have been established, particularly in the Angami country. Luzeku Sema who gave evidence before the Commission for the Sema Nagas, for whom one school only has so far been opened, no doubt correctly represented the general view of his people in regard to education when, in reply to a question, he said "some boys would like to learn when they are young, and the parents are quite ready to give them education, but during the years of education they have to feed them without getting any return from them, so that people are not very keen about it." In 1926-27, 2,401 boys were receiving primary, and 79 boys secondary, education in government schools in the Naga Hills; this represented an increase of 114·3 per cent over the number of pupils in 1921-22.

11. CO-OPERATION.

Although the co-operative movement in Assam began with the constitution of Eastern Bengal and Assam as a separate province in 1905, little headway was made till 1919, when the staff under the Registrar of Co-operative Societies was strengthened. The need for the movement was as great in this province as anywhere else in India. Agriculturists in Assam have always depended on traders and moneylenders, whether local or Marwari, for providing them with the credit they require for agricultural and other purposes. The loans, however, which they get from this source are usually obtained on very hard terms, the rate of interest being seldom less than 25 per cent and, in some cases, being as

high as 60 per cent per annum. Long-term credit is obtained only on mortgage security, and the borrower also incurs substantial loss by being compelled to sell his produce through the moneylender.

Attempts to improve the financial condition of cultivators by the formation of co-operative societies began to be made in 1905. The societies formed were credit societies, and development until now has been almost entirely on the credit side of the movement. At the end of March, 1919, the province had 333 agricultural credit societies with a membership of 11,465 and a working capital of Rs. 5 lakhs. To finance these societies there were 15 central banks with a working capital of Rs. 4½ lakhs. By the end of March, 1927, the number of agricultural societies went up to 998; the membership to 42,500; and the working capital to Rs. 18¼ lakhs. Of the working capital, Rs. 78,000 formed the share capital, Rs. 1¾ lakhs was held on deposit from members, Rs. 1½ lakhs on deposit from non-members, while Rs. 10½ lakhs were borrowed from co-operative banks or societies; the reserve fund amounted to Rs. 3¾ lakhs. To finance the primary societies there was the Provincial Bank with a capital of Rs. 2½ lakhs, and 15 central banks with a capital of Rs. 10½ lakhs. During the year societies of all descriptions advanced to their members loans amounting to Rs. 11½ lakhs. The usual rate of interest on the loans was 15⅝ per cent. Although this rate is high, it compares favourably with the average rate on loans given by moneylenders, which is 36 per cent.

An attempt is now being made to organise the supply of long-term capital to agriculturists; and a start has been made by the formation of one land mortgage bank in Kamrup and another in Sylhet. There are, at present, no separate purchase societies but the Agricultural Department distributes seed and implements through the medium of existing credit societies. The transactions of this kind amounted to Rs. 17,000 last year. Attempts to organise co-operative sale have so far not met with much success. But a jute sale society has recently been formed.

The department is controlled by the Registrar who also holds the post of Director of Agriculture and Industries. For the co-operative work, he has under him one assistant registrar, a provincial auditor, and eleven inspectors. The audit of societies is done by these government-paid inspectors who do both the work of inspection and of audit. Fees for audit are recovered from societies. The department is assisted by honorary organisers, of whom there are twelve at present. These help the official staff in doing propaganda and in popularising the movement.

A recent development has been the formation of the Surma Valley Co-operative Organisation Society which was registered under the Act in 1925-26, and has as its objects the spread of the principles of co-operation and the carrying on of rural development work in the Surma Valley, in the direction of improved sanitation, medical aid, and promotion of rural industries through the medium of co-operative organisations. Though of recent origin, it has, by the publication of a quarterly journal and in other ways, done much to stimulate interest in the movement.

It will be seen, both from the membership and the capital involved, that the movement has so far only touched the fringe of the problem of rural development in Assam.

12. COMMUNICATIONS AND MARKETING.

Although there has been a considerable extension of roads and railways in recent years, the chief means of communication in the province is still its waterways. The Brahmaputra is navigable by large passenger and freight steamers as far up as Dibrugarh ; large steamers can get as far up the Surma River as Silchar in the rainy season and to Fenchuganj in the cold weather. Small feeder steamers ply on the larger tributaries in both valleys, while ordinary country boats are very largely used on the network of streams which intersect the Surma Valley and, to some extent also, in Lower Assam. The smaller rivers and streams in Upper Assam do not admit of navigation throughout the year, the bulk of the trade being carried to and from the Brahmaputra by road.

The first railways to be constructed in Assam were two small systems in the north-east corner of the province—a portion of the Dibru-Saidya Railway, constructed and controlled by the Assam Railway and Trading Company, to connect the tea estates on the left bank of the river with the steamer ghat at Dibrugarh, and a portion of the Jorhat Provincial Railway which provided a similar outlet further down the river at Kohilamukh Ghat. Some years later (1894), the Tezpur-Balipara Railway provided a third outlet at Tezpur. These three systems acted merely as feeders to the steamer traffic on the Brahmaputra which was still the sole channel of communication leading to the outer world, and this distinction remained unchallenged until the first section of the Assam Bengal Railway in Assam, from Akhaura to Badarpur, was opened for traffic in 1896 and, five to seven years later, extended to Tinsukia where it joins the remotest of the early railways, the Dibru-Saidya Railway. A third outlet was provided when the branch from Lumding to Gauhati was connected up to the Eastern Bengal Railway at Amingaon on the opposite side of the river, thus establishing direct communication with Calcutta. The total length of railways in the province is a little over one thousand miles.

There are three main trunk roads in the province, *viz.*, the North Trunk Road, the Assam Trunk Road and the Cachar Trunk Road. The first of these lies on the north bank of the Brahmaputra and runs from Dhubri through the headquarters towns of Mangaldai, Tezpur and North Lakhimpur to a point on the Brahmaputra immediately opposite Dibrugarh on the south bank. The Assam Trunk Road runs from Fakirganj on the south bank of the Brahmaputra through Goalpara, Gauhati, Nowgong, Jorhat and Dibrugarh to Saikhowa on the south bank opposite Saidya. The Cachar Trunk Road lies wholly in the Surma Valley and connects the two district headquarter towns of Sylhet and Cachar.

Two other important roads are those which run from Gauhati through Shillong to Cherrapunji on the south slope of the Khasi Hills, whence a

bridle path winds down to the plains of Sylhet, and the road from Dimapur (a station on the Assam Bengal Railway) through Kohima in the Naga Hills to Manipur. This road is continued as a bridle path into Burma. These two roads are metalled throughout and are the only metalled roads of any considerable length in the province.

The total milage of the roads, including village roads and bridle paths, is 9,821 miles, of which only 579 miles are metalled. The Public Works Department is responsible for the upkeep of about three-quarters of the length of metalled roads, and for about two-fifths of the length of unmetalled roads including bridle paths and village roads; the remainder is maintained by local bodies. On account of the physical and climatic conditions, the construction and maintenance of roads is a costly business and the rate of expansion is not so rapid as it would be if more funds could be set aside for the purpose.

Trade in Assam is carried on in two different directions: firstly, the external and internal trade by rail and river, and, secondly, the trans-frontier trade with the States and tribes which border the province in the north and east. The external trade is almost all with Bengal, chiefly with Calcutta which receives about sixty per cent of the exports and supplies seventy per cent of the imports. The principal agricultural products are tea, paddy, oil-seeds, jute, cotton, potatoes and oranges. Lac, too, is important. Nearly all the paddy exported goes from the Surma Valley; on the other hand, rice is imported in considerable quantities by the tea gardens in Upper Assam. Tea is consigned straight from the gardens to Calcutta, and to an increasing extent to Chittagong also, either to be sold or shipped to other countries. A large proportion of the export trade in mustard from the Assam Valley is in the hands of a class of traders who are natives of Kamrup district; but almost all the rest of the export traffic in that region, and nearly the whole of the import traffic, is carried on by Marwari traders from Rajputana, known as *kaiyas*. In the Surma Valley, the local population contains a large trading element and the *kaiyas* are comparatively rare, but here too the foreign trader is represented in considerable force by merchants from Dacca.

The extent to which the hill tribes engage in trade varies very considerably from tract to tract. The people of the Khasi and Jaintia Hills keep much of the trade in their own hands, and merchants from among them travel as far as Dacca and Calcutta to sell their produce. Most of the tracts, however, do not produce sufficient food for the people to live on, and traffic with the plains therefore becomes a necessity. In general, it takes the form of simple barter, commodities like cotton, wax, ivory and forest produce being exchanged for rice, salt, dried fish, clothing, etc. The trans-frontier trade, too, is largely carried on by the barter of commodities such as rice, cotton cloth and yarn, silk and metals in exchange for Assamese ponies and such products as lac, spices, raw sugar, blankets and musk. All over the province there are numerous *hats*, or markets where business is done once or twice a week. The

following statement, taken from the 1921 Census Report, gives an idea of the area and population served by such rural markets :—

District	Actual number of markets	Number of markets per 100,000 of population	Average number of square miles served by a market
Goalpara	110	14	36
Kamrup	41	5	94
Darrang	57	12	51
Nowgong	43	11	86
Cachar Plains	118	24	17
Sylhet	313	15	15
Khasi and Jaintia Hills ..	104	43	58
Garo Hills	27	15	116

These are centres at which all the necessities and a good many of the luxuries of life can be bought and sold—grain, fish, fruits and vegetables, salt and groceries, tobacco and betel, oil and *gur*, cloth and yarn, implements and utensils, fancy and miscellaneous articles. The small cultivator's produce is brought for sale either by the cultivator himself or by the local trader who has bought in the villages. From the *hat* the surplus produce finds its way through various intermediaries to the large local consumers and to the Indian and export market. The well-to-do cultivator is generally in a position to deal directly with the larger merchants or the agents of big Calcutta firms. Agents from those firms are sent up at special seasons to buy special crops—cotton, lac, jute and mustard. Traders from Bengal come in boats and buy quantities of rice from the interior in the Surma Valley. Frequently, money is advanced against the standing crops a month or two before the harvest. An example of a *kaiya's* transaction, given in the Census Report, shows that the lender reaps a profit of 47½ per cent in three months on his money.

13. LOCAL SELF-GOVERNMENT.

The provincial Government in Assam is of the same type as obtains in other Indian provinces. The Governor acting with two Ministers administers the "transferred" departments, *viz.*, Education, Agriculture, Veterinary, Industries, Co-operative Societies, Registration, Local Self-Government, Medical Services, Public Health and Excise.

The unit of local administration is the local board. These boards are regulated by the Assam Local Self-Government Act of 1915 with subsequent amendments, of which the Act of 1926 (No. VIII) is the most important as it made the election by the board of its chairman the normal procedure and also gave the boards power to levy annual license fees on motor vehicles, carriages and carts. The boards are confined to the districts in the plains, and number nineteen in all, twelve in the Assam and seven in the Surma Valley. They are responsible for communications, vernacular education, medical and veterinary dispensaries, sanitation and water supplies.

The Local Self-Government Act of 1915 provided for the setting up of village authorities. By the end of 1927, 239 such authorities had been established. In 1926, the Assam Rural Self-Government Act (No. VII) was passed. This Act, which extends to the whole of Assam, enlarged the powers conferred on the village authorities by the Act of 1915. This Act will probably be brought into force in the course of 1928. Under it an authority may be constituted for a village or a group of villages ; it will consist of such number of members not exceeding nine as the local Government may fix in each case ; all members are to be elected ; the electorate will consist of all male persons over twenty-five years of age and resident in the village ; every one qualified to be an elector will also be qualified to stand for election as a member of the village authority. The primary responsibilities of the authorities are communications, sanitation, water supply and medical relief. The local Government may also transfer to approved authorities, under certain conditions, the management of village forests. A Village Development Fund, financed chiefly from provincial revenues, will be created for the whole of Assam. A contribution may be made from the fund to the expenses of each village authority which are also met in part by a contribution from the local board of the area and by the proceeds of penalties, fines and fees. The Act of 1926 empowers a village authority to raise money by imposing an assessment on the village.

Under the same Act, village benches may be set up for the trial of minor criminal offences and village courts for the trial of minor civil offences. Both bench and court consist of three or more residents within a village area who may or may not be members of the village authority. A complete scheme of village self-government has thus been provided. Up to the end of 1927, 239 village authorities and 92 village benches and courts had already been constituted under the provisions of the earlier Act of 1915. They are all situated in the Assam and Surma valleys.

14. PUBLIC HEALTH AND SANITATION.

The medical institutions in the province are under the control of the Inspector General of Civil Hospitals. His staff consists of nine civil surgeons belonging to the Indian Medical Service, each of whom is in charge of a district ; the remaining districts are in the charge of military or civil assistant surgeons. Including the institutions directly under the Public Health Department, the total number of institutions for the treatment of disease numbered 237 in 1926, and at these over a million-and-a-half of patients received treatment.

The Public Health Department is administered by a Director who is a member of the Indian Medical Service, assisted by an Assistant Director. The staff consists of a vaccination inspector for each district and a sub-inspector in each subdivision if the district is divided into subdivisions. In addition, there are two mobile units specially trained for epidemic duties, each consisting of three sub-assistant surgeons and six disinfectant carriers, and there is a special organisation for dealing with *kala-azar*, consisting of six assistant surgeons and 113 sub-assistant surgeons.

The Public Health Laboratory undertakes the analysis of water and food samples brought for examination by a peripatetic sample taker. Vaccine lymph is made at the provincial vaccine depôt at Shillong.

General public health projects affecting the province are considered by the Provincial Public Health Board. For the control of epidemics, there is a special Health Board (Epidemics) which co-ordinates the activities of the Public Health and Medical departments.

Most of the time of the Assistant Director is devoted to epidemic duties including *kala-azar*. The inspectors and sub-inspectors inspect the work of the large staff of vaccinators employed by local boards, and of government vaccinators in the hill districts, under the general supervision of the district surgeons. The epidemic units, or sections of them, are sent out to deal with outbreaks as occasion arises, sometimes under the personal supervision of the Assistant Director. In districts in which *kala-azar* infection is heaviest, the special *kala-azar* organisation supplements the efforts of the government and local board dispensaries, and maintains special institutions of its own, when necessary, where no others exist. Each of the six special assistant surgeons has been posted to an infected district and does all the *kala-azar* work of that district under the civil surgeon, besides helping with any other epidemic that may arise as well as public health propaganda.

Some idea of the immensity of the public health problem can be gathered from the figures of the number of patients treated in 1925-26, just quoted, which was of the order of about one in every five of the population. Housing, rural water supply and sanitary arrangements leave much to be desired and most of the ills which afflict the ryots in other provinces are present here also, plague being a notable exception and *kala-azar* perhaps a still more notable addition. Assam is indeed the home of *kala-azar* and has probably suffered from it to an extent unknown in any other country in the world. The first epidemic concerning which information is available occurred in 1881 ; in the succeeding decade, it exacted a terrible toll of human life, leaving whole tracts deserted and uncultivated. Between 1891 and 1901, the population of Kamrup decreased by seven per cent and in Nowgong by more than one-fourth. From that time a period of quiescence intervened although the disease lingered on in endemic form in certain areas. In 1920, a general recrudescence occurred in those areas, together with a tendency for the disease to spread further afield. Providentially for Assam, medical science has discovered an effective treatment and though there has been an increase in the number of deaths, particularly between 1922 and 1925, there are indications that the disease is now under control and that its further spread has been arrested. Over 60,000 cases were treated in 1925, the mortality in the same year being 6,365. Twenty years ago practically all of the 60,000 would have been doomed to death.

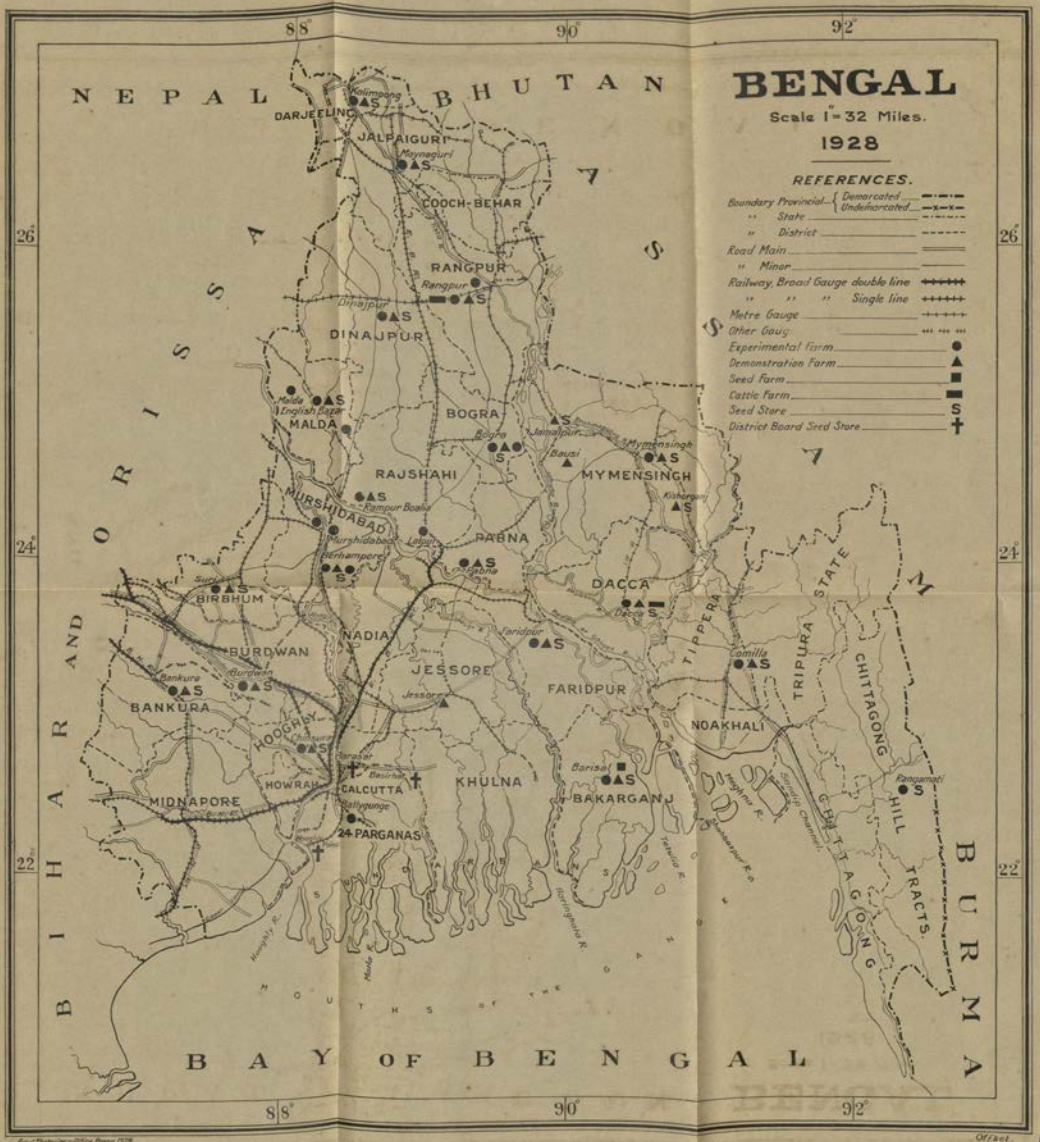
Next to *kala-azar*, malaria is probably the most potent enemy to human life. In a few localities, special anti-malarial measures, such as the clearance of jungles and undergrowths, the improvement of drainage and the treating of sheets of water with kerosine are being carried out

by Government and by tea companies. Quinine is sold, below cost price, through the post offices and other agencies, at the rate of 4½ annas per 20 tablets of 4 grains each. Enclosed with the treatment is a printed copy of instructions to enable the patient to treat himself.

The organisation for dealing with small-pox has succeeded in bringing the mortality due to that disease to a very low figure. The staff of vaccinators maintained by the local boards is sufficiently strong to permit of each village being visited during the vaccination season from October to March. Vaccination is not compulsory, but sometimes it is necessary to introduce temporary regulations making it compulsory in villages in which there is opposition to vaccination and small-pox is prevalent. Cholera inoculation has come rapidly into favour since the two epidemic units started work in 1925.

A considerable amount of propaganda work is carried out among the general public and in schools by the *kala-azar* assistant surgeons. Lantern demonstrations are given dealing with the prevalent epidemic diseases; bulletins and pamphlets are issued and pictorial posters are freely displayed in public places.

The local boards are responsible for village sanitation, watersupply, conservancy and drainage, and have their own staff of engineers for drawing up schemes. In some cases, the boards have delegated certain powers to local *panchayats* or 'village authorities' which control groups of villages. Government placed at the disposal of local boards a sum of Rs. 3 lakhs in each of the years 1925-26 and 1926-27, and of Rs. 4 lakhs in 1927-28, to be used entirely at the boards' discretion for the improvement of rural watersupplies.



Govt. Photo. Office, Poona, 1928.

Offset.

BENGAL

1. GENERAL FEATURES AND NATURAL DIVISIONS.

In 1854 the Presidency of Bengal, which had till then been directly in charge of the Governor General, became a Lieutenant-Governor's province. At that time, it included practically the whole of the present provinces of Bengal, Bihar and Orissa and Assam. It is unnecessary to give details here of the changes in the territorial limits of the province between that date and 1912 when the existing limits were fixed and Bengal again became a presidency. It has a total area of just over 52½ million acres or 2 million acres more than the area of England including Monmouthshire. Of this area the Indian States of Cooch Behar and Tripura account for some 434,000 acres. The presidency is bounded on the north by Nepal, Sikkim and Bhutan, beyond which lies Tibet. A traveller entering the presidency from this direction, would descend from the Himalayas into the submontane districts of Darjeeling and Jalpaiguri. Continuing his journey south he would pass rapidly into the vast and fertile alluvial plain, the gift of the Ganges and the Brahmaputra, which forms the main part of the presidency, and, after a journey of some 300 miles from the point of entry, would reach Calcutta, the capital, beyond which lie the forests, creeks and swamps for ever wresting from the Bay of Bengal fresh additions to the cultivated area which lies behind them. The presidency is bounded on the east by Assam and on the west by Bihar and Orissa. Its greatest width (about 250 miles) is in the south. In shape, Bengal is, therefore, true to the conventional picture of a delta which, in fact, it is, for the low lying laterite tract of the *barind* in the north-west and the undulating laterite tracts traversing the four western districts of the presidency, though of importance in considering the agricultural features of the country, are insignificant in extent in comparison with the true deltaic areas.

Broadly speaking, the country is homogeneous. Divisions such as north, west, central and eastern Bengal depend on various stages of the process of land making by the great rivers whose vagaries determine the physical geography of Bengal.*

Since Major Rennell's survey of the rivers of Bengal, between 1764 and 1775, successive changes in the course both of the main stream of the Ganges and its tributaries have greatly altered the physiographical character of the country.

North Bengal extends from the lower spurs of the Himalayas to the Ganges. It has been subject to great fluvial changes, and the country is seamed with silted channels. The "old alluvium" appears in the south-western portion of this area.

Western Bengal may be divided into two distinct zones, one a low-lying delta formed by the Bhagirathi, Damodar, Ajay and Rupnarayan

* For a detailed description see Oldham's *Geology of India.*

rivers, the other a rolling upland country with conditions approximating to those obtaining in the arid plateau of Central India. A considerable part of this tract has a hard ferruginous soil unsuitable for cultivation, but this division of the presidency is specially rich in mineral resources.

Central Bengal is typical of a delta in which the process of land formation has almost entirely ceased. It lies between the Bhagirathi on the west and the Padma on the north-east. The greater portion of this tract is free from inundation and is described as a land of dead and dying rivers, a land of low rice plains and swamps.

In contrast to central Bengal, eastern Bengal is a delta in which the creative energies of the Ganges and the Brahmaputra are still at work. The land is consequently subject to annual inundation and receives annually a deposit of fertilising silt. As the country is covered by a network of rivers, streams and creeks, the huts of the cultivators are usually clustered together on the high river banks and on artificial mounds. During the rains all communication is by boat. "A visitor to one of these hamlets in the rains," it is stated in the Settlement Report of 1917 of the typical district of Dacca, "may see a grey-bearded patriarch swimming towards him from the fields and may be asked for alms by an old woman standing in water breast high amongst the jute plants." Indeed, the people who live in these tracts are almost amphibious in their habits.

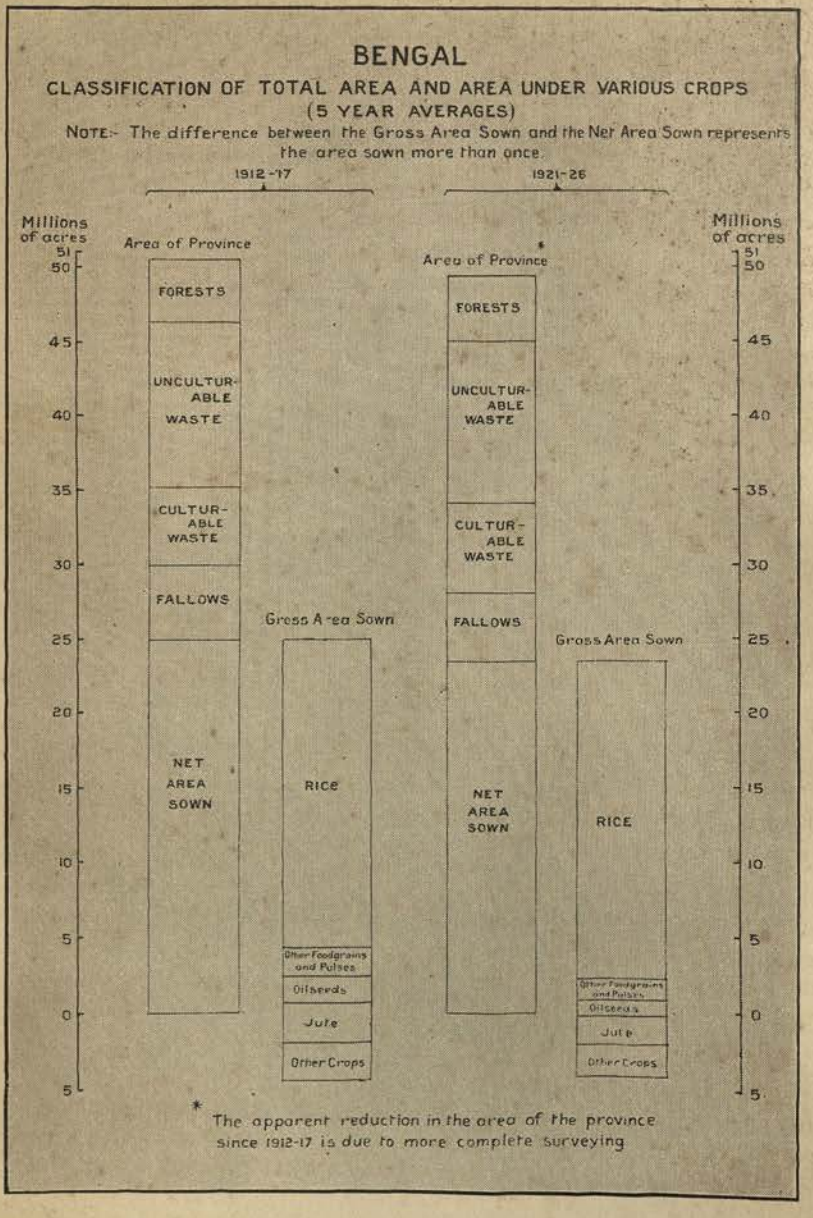
The southern portion of eastern Bengal is known as the Sundarbans, meaning literally the forests of *sundari* trees (*Heritiera littoralis*). The area is approximately 6,500 square miles in extent, or about half the size of Holland.

In the north of this tract the morasses have been converted into fertile rice fields, and cultivation is gradually extending southwards. Its spread is conditional on the eradication of jungle, the construction of dams and dykes to keep out salt water, a rainfall sufficient to wash the salt out of the soil, and, last but not least, a supply of drinkable water—that first essential of human settlement.

In addition to the areas described above, there are two tracts outside the alluvial zone, namely, (1) the Chittagong Hill tracts and Hill Tippera and (2) the frontier district of Darjeeling.

Bengal receives its rainfall from the Bay of Bengal monsoon current and by far the greater part of it falls between the months of June and October. The distribution is uneven, ranging as it does from 50 to 60 inches westward of Calcutta and from 60 to 120 inches further east and north until, as the hill areas are reached, rainfalls of as much as 154 to 209 inches are recorded. The climate is warm and damp and frost is unknown, except in the districts of Darjeeling and Jalpaiguri.

The soils of Bengal are almost entirely of alluvial origin though of two very different types. The more important type, as regards area, is what is usually termed the new alluvium which consists of mixtures of sand, silt and clay in widely differing proportions and of very varying



To face page 32

degrees of fertility. Its general characteristic is, however, easy cultivability. The old alluvium—the second type—which occurs mainly in the west and west central districts consists of laterite formations of varying grades of sand and clay with nodules of hæmatite which give them their characteristic reddish colour. Cultivation of these soils in a dry state presents great difficulty and, for the most part, therefore, crops are only sown on them during the summer rains (*kharif* crops), whereas on the new alluvium, crops are also sown during the winter (*rabi* crops).

The cultivated area in Bengal is approximately 28½ million acres or 58 per cent of the total area. Of the gross area cropped (*i.e.*, including the double cropped area), about 84 per cent is under food crops, 9 per cent under jute, nearly 4 per cent under oil-seeds and the remainder under various non-food crops.

Bengal is perhaps the foremost rice-producing region of the world. The physiographical characteristics of the tracts described above largely determine the manner in which rice can be grown and also the variety of rice to be chosen. The numerous varieties of rice grown in Bengal may be divided into three groups, according to the time at which they are harvested. These are—

(1) *Aman* (winter paddy), sown from March to May, harvested in November and December.

(2) *Aus* (autumn paddy), sown from March to May, harvested from July to September.

(3) *Boro* (spring paddy), sown in November to January, harvested from April to May.

Of these, *aman* rice is the most important and occupies about three quarters of the rice area.

The millets, maize and sugarcane are characteristic crops of the old alluvium. With these exceptions, the crops of Bengal are grown chiefly on the new alluvium. The most important crops are rice and jute ; next to these come oil-seeds, followed by various pulses, tobacco and sugarcane. The relative importance of these staple crops has not changed materially since the beginning of the century.

There thus seems no reason to believe that the increase in the area under jute has made a serious inroad on the food supply of the province. Jute is not a rival to *aman* paddy which is transplanted after the jute harvest or grown in land unsuitable for the common varieties of jute. Very little cotton is at present grown in Bengal.

Important crops, though their precise area is not known, are vegetables (of which the brinjal or egg plant and two varieties of cucumber are the most considerable with potatoes as a crop of rapidly increasing importance), *pan* or betel leaf, arecanut and fruits which comprise the coconut, plantain (banana), mango, pineapple, jack, guava, custard apple, *lichi* and several varieties of melon.

The crops are, in short, characteristic in their variety and richness of a fertile well watered delta favoured with a sub-tropical climate. It is chiefly in the tracts of old alluvium where millets, maize and sugarcane are grown, that the water supply is insufficient and irrigation is required.

Raw jute, rice and oil-seeds are the three principal exports of agricultural produce from Bengal. The following Table shows the extent of the export during the last ten years :—

EXPORTS

—	Jute (raw)	Rice	Oil-seeds
	Cwts. (000's)	Cwts. (000's)	Cwts. (000's)
1917-18	5,561	1,428	1,202
1918-19	7,914	3,069	2,902
1919-20	11,718	963	3,135
1920-21	9,432	210	2,274
1921-22	9,335	234	2,545
1922-23	11,513	4,158	3,342
1923-24	13,184	5,976	5,123
1924-25	13,827	6,472	4,451
1925-26	12,812	2,870	3,430
1926-27	14,118	2,184	2,600

2. PROVINCIAL INCOME AND EXPENDITURE.

2. PROVINCIAL INCOME

The attached Table shows the main heads of income and expendi

The outstanding feature of the revenue of Bengal is the effect which the rise in the value of land and its produce.

GOVERNMENT

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Taxes on Income ..	93	....	....	....	....	....
Land Revenue	302	313	313	311	301	311
Excise	183	201	210	215	228	225
Stamps	274	302	317	337	358	332
Forests	19	23	23	25	28	31
Other heads	25	49	47	47	59	55
Railways	2	....	1	1	1	1
Irrigation	....	....	3	3	....	....
Debt—Interest	4	3	3	3	3	4
Civil Administration—						
Administration of Justice ..	12	15	13	13	14	14
Jails and Convict Settlements..	15	11	13	13	11	12
Police	4	6	5	7	7	6
Education	11	10	10	11	12	13
Medical	6	6	8	7	8	9
Agriculture (including Veterinary and Co-operation).	2	3	3	3	2	4
Industries	15	7	6	7	7	5
Other departments ..	....	....	9	1	1	2
Civil Works	6	8	6	7	6	6
Miscellaneous	15	28	23	21	24	20
Miscellaneous adjustments between Central and Provincial Governments.	....	....	....	2	....	....
Total, Revenue Receipts ..	988	985	1,013	1,034	1,070	1,050

* The interest on the whole of the capital expenditure on irrigation, whether provided by loans or by

† The head "Debt—Interest" represents the total payments for interest on loans, less the amount to the inclusion of interest on capital provided from revenue, exceeds the interest on loans, a *minus*

AND EXPENDITURE.

ture during the six years ending 1926-27.

the permanent settlement has had in depriving the State of a share in

OF BENGAL

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue	36	29	29	31	36	39
Forests	13	13	13	15	14	18
Other heads	40	42	41	41	54	53
Irrigation (Interest on debt and miscellaneous expenditure) Revenue account.*	27	29	37	32	34	36
Irrigation—Capital Account charged to Revenue.	35	−21	18	4	−3	....
Debt—Interest†	−8	−8	−6	−8	−8	−3
Civil Administration—						
General Administration ..	113	121	120	116	120	124
Administration of Justice ..	104	113	109	110	111	111
Jails and Convict Settlements..	38	36	33	32	31	33
Police	193	187	179	182	183	190
Education	121	123	125	122	133	137
Medical	53	55	51	57	59	59
Public Health	23	25	24	29	24	34
Agriculture (including Veterinary and Co-operation).	21	21	20	18	20	22
Industries	12	13	10	10	12	12
Other departments ..	3	6	4	13	11	11
Civil Works	142	102	93	96	111	113
Miscellaneous	81	73	78	76	89	87
Contributions and assignments to the Central Government.	155	....	....	....	....	....
Total, Expenditure charged to Revenue.	1,203	959	978	976	1,031	1,071

appropriations from revenue, is charged under the head "Irrigation—Revenue Account."

charged as interest to commercial undertakings such as irrigation. Where the latter amount, owing figure may result under the head "Debt—Interest."

GOVERNMENT

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Receipts						
Revenue Surplus	....	26	35	58	39	....
Loans and Advances ..	49	10	12	13	8	8
Loans between Central and Provincial Governments.	168	51	....	....	24	7
Famine Insurance Fund ..	2	2	2	2	2	2
Total, Capital Receipts ..	219	89	49	73	73	17
Opening Balance	120	68	91	130	194	238
Total ..	339	157	140	203	267	255

OF BENGAL

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Expenditure						
Revenue Deficit	215	....	....	....	....	21
Construction of Irrigation Works	50	52	....	....	—2	3
Civil Works	....	....	....	....	7	7
Loans and Advances ..	6	12	6	4	19	7
Loans between Central and Provincial Government.	....	2	4	5	5	5
Payment of commuted value of pensions.	....	....	....	....	....	13
Total, Capital Expenditure ..	271	66	10	9	29	56
Closing Balance	68	91	130	194	238	199
Total ..	339	157	140	203	267	255

3. REVENUE ADMINISTRATION AND LAND RECORDS.

The presidency is divided into five administrative divisions * each under a Commissioner. These divisions are made up of 27 districts (excluding Calcutta) each under a Collector or Deputy Commissioner. The unit of revenue administration is the district. Revenue questions which cannot be settled finally by the officer in charge of the district go up (except in respect of Excise and Salt for which there is a special Commissioner) to the Divisional Commissioner and from him, if necessary, to the Revenue Department of Government or the Board of Revenue.

The main sources of revenue in Bengal are land revenue, excise and stamps. There is also the public works cess which is the mainstay of finance required for local self-government.

The outstanding feature of the land revenue assessment in Bengal is that by far the greatest portion of it is fixed under the permanent settlement concluded by Lord Cornwallis in 1793. In this permanently settled area, the feature from an agricultural point of view is the absence of a subordinate revenue staff such as is maintained in temporarily settled areas. The consequence is that much less is known about the state of cultivation and the condition of crops, as reliance has to be placed on district officers and their subordinates who are relatively few in number and, moreover, do not need to obtain such information for the performance of their ordinary duties.

The conditions of this permanent settlement (which confirmed a "decennial" settlement completed in 1791—the first comprehensive settlement undertaken after the succession of the East India Company in 1765 to the Dewani of Bengal, Bihar and Orissa †), were embodied on a proclamation issued on 22nd March, and now known as Regulation I of 1793. It declared that the zamindars, independent talukdars, and other actual proprietors of land with whom the "decennial" settlement had been concluded would be allowed to hold their estates at the same assessment for ever, but that "no claims for remission or suspension of rent were to be admitted on any account and lands of proprietors were to be invariably sold for arrears." The question of the precise effect of this declaration on liability to new general taxation has never been finally settled. The latest judicial pronouncement on the subject is a judgment by the Calcutta High Court, delivered in 1927. By a majority of three to two, the full bench of Judges held that income derived from land in permanently settled estates is liable to income-tax. In the same proclamation, proprietors were declared to have the privilege of transferring their lands without the sanction of Government and partition of estates was freely allowed. Thus, the creation of a landlord class and the privileges conferred on them gave rise to a series of agrarian complications which Government sought to regulate by subsequent tenancy laws. The amount of revenue derived by Government from

* Burdwan (West), Rajshahi (North), Dacca (East), Chittagong (East) and Presidency (Central)

† At that time "Orissa" comprised only a small tract of country now included in the Midnapur district of Bengal.

the permanent settlement, which included areas in what are now the provinces of Bihar and Orissa and Assam, was 286 lakhs of rupees per annum (or at the rate of 1*s.* 6*d.* to the rupee, £2,145,000), and the only increase which has since occurred * has been due to the resumption and assessment during the first half of the nineteenth century of a large number of estates which had been claimed as free of revenue. According to the Report of the Land Revenue Administration for 1918-19, the gross rentals amounted to 1,285 lakhs of rupees and the land revenue to 279 lakhs of rupees, leaving as the balance intercepted by the landholders (including tenure holders) Rs. 1,006 lakhs. The value of the produce of the permanently settled estates has, on the other hand, risen enormously, and the whole of this increase *plus* the produce from new cultivation within the areas of these estates has been shared between the zamindars and their tenants.

Calculations made in the course of the settlement of the district of Mymensingh in eastern Bengal showed that Government received about 0·4 per cent, the landlords not more than 5 per cent, and the tenants the balance of the money value of the crops.

The loss of revenue resulting from the permanent settlement may be gauged from the figures of increase of government revenue from the temporarily settled estates and from *khas mahals* † for the last two decades. As these latter are interspersed among the permanently settled areas, conditions may be regarded as comparable.

—	1900-01	1912-13	1923-24
	Rs.	Rs.	Rs.
Revenue from temporarily settled estates ..	13,20,193	15,30,822	20,11,187
Revenue from *khas mahals*	27,38,420	39,48,416	51,59,331

With regard to the system of rent, the chief point of interest is that competition or economic rents hardly exist in Bengal.

The Board of Revenue in a letter which the Indian Taxation Enquiry Committee published with its Report stated "that the contention that competitive cash rents do not exist in Bengal is borne out by the fact that, proportionate to the value of the produce, the rents in eastern Bengal are lower than in western Bengal, although the incidence of population is much higher and hence the competition for land is much keener in eastern than in western Bengal. Nor can the rents be said to be economic rents for the rents payable bear no apparent relation to the value of the produce. Again, where waste lands or *khas* lands of the landlords are newly settled, the rent fixed is not a competitive or an economic rent, but settlement is made at the customary or local

* Excluding revenue from certain areas included in the permanent settlement but which have since reverted to Government at revenue sales and become part of the temporarily settled area.

† Government Estates.

rates, and the landlord exacts a *salami* * on settlement in addition to the rent."

The financial effect of the permanent settlement in Bengal is also clearly exhibited by the following figures of total land revenue assessment, total population and incidence per head of the assessment in all the major provinces. The figures are taken from the "Agricultural Statistics of India" for 1924-25.

	Total land revenue assessment	Total population	Incidence per head
	Rs. (in 000's)	(in 000's)	Rs. a.
Madras	7,28,39	42,319	1 11
United Provinces	6,99,58	45,376	1 9
Burma	5,73,13	13,212	4 15
Punjab	5,17,07	20,662	2 8
Bombay	4,38,38	18,116	2 7
Bengal	2,88,74	45,788	0 10
Central Provinces	2,19,85	13,913	1 9
Bihar and Orissa	1,56,60	34,002	0 7
Assam	1,05,35	7,469	1 2

It has already been noted that Regulation I of 1793 fixed the land revenue of Bengal for ever with the idea that the zamindars could devote themselves to the improvement of their estates with the knowledge that they would reap the full benefit. The same Regulation stipulated that, in return for this concession, they should show the same consideration to their dependent talukdars and tenants. Government specifically reserved to itself the right to protect all classes of people and to enact such regulations as it might think necessary to ensure that the zamindars fulfilled their obligations. Art. VII (1) of the Regulation declared that this was the duty of the Ruling Power.

At the time there was more land than the people could cultivate, and the zamindars were anxious to attract cultivators and to keep their tenants. As the pressure of population on the soil increased, the situation was reversed and many abuses came to the notice of Government. The attempts on the part of Government to fulfil their obligations to the tenants have a long history.

In 1859, legislation was passed with the object of giving the ryot some measure of protection; this failed, however, of its purpose and the relations between the zamindar and his tenant are now regulated by the Bengal Tenancy Act of 1885. The objects of this Act are: (1) to give the settled ryot the same security in his holding as he enjoyed under the old customary law, (2) to ensure the landlord a fair share of the increased value of the soil and (3) to lay down rules by which all questions in dispute between landlord and tenant can be reduced to simple issues

* The *salami* is a lump sum payment which is in effect a commutation of the competitive element in the rent.

and decided upon equitable principles. It should, however, be noted that the Bengal Tenancy Act did not make any distinction between tenants who paid their rents in cash and those who paid in kind. There have been various amendments of the Act, of which the most important are those effected by Act III of 1898 in regard to the preparation of records of rights and the enhancement and reduction of rent and by Act I of 1907 conferring greater authority on the records of rights when duly prepared and published, but the principles of the Act of 1885 remain unaltered and with the amending legislation the Act provides a complete code governing the most important relations between landlord and tenant.

It should be mentioned that the tenures and sub-tenures regulated by this legislation and constituting intermediate interests between the zamindar and the cultivating ryot are often extremely numerous. In the district of Backerganj, for example, there may be as many as eighteen such intermediate interests, all of which are heritable, transferable and permanent, while the cultivating ryot will eke out his income by himself sub-letting part of his land to under-ryots.

It should also be mentioned that the status of *bargadars* (that is, those cultivators who pay the owners of the land a fixed share of the produce) is still undecided. In most parts of Bengal, they are regarded as labourers and not as tenants. A Committee appointed in 1923, to consider the amendment of the Bengal Tenancy Act, recommended that "all cultivators paying a fixed quantity of produce should be treated as tenants, and also those *bargadars* who employed their own cattle and implements of agriculture; in other cases, where the landlord supplied the plough and cattle, the cultivators should be treated as labourers." No action on the Committee's recommendations has yet been taken.

Temporarily settled tracts comprise an area of 8,000 square miles as compared with the 59,000 square miles permanently settled, but they bring in a revenue to Government of 75 lakhs as compared with 214 lakhs from the permanently settled area. The temporarily settled tracts which are found in nearly all districts are made up of estates which have become the property of Government by purchase at revenue sales, the district of Darjeeling, the Western Duars in Jalpaiguri, the Noabad area in the Chittagong district, the Chittagong Hill tracts, the islands and more recently deforested areas in the Sundarbans, and finally the lands which have come into existence as the result of the ever recurring changes in the courses of the rivers.

Land Records and Survey.

A primary object of the framers of the permanent settlement of 1793 was to record all rights in land, but up to the passing of the Land Registration Act in 1876, the law as to registration was not strictly enforced. The object of the Act of 1876 was not to make an inquisition into titles, but to identify all individuals on whom might be imposed certain duties and obligations in virtue of their being in possession of land as proprietors.

Consequently, every person in possession of land, whether revenue paying or revenue free, is required to register full particulars. But such registration does not deal with subordinate rights and interests. For several years after the permanent settlement, endeavours were made to maintain a record of these, but without success. The record of rights prepared under the Tenancy Act of 1885 provides a full account of all subordinate tenancies then existing. The possibility of keeping this record up to date has been frequently canvassed since (on the last occasion in 1914 by the District Administration Committee), but the great cost involved has always prevented action. The general result is, therefore, that, except in the temporarily settled areas, information as to subordinate interests is very defective.

As regards survey, the position is as follows. A general revenue survey was begun in 1835 and concluded in 1878. The only parts of the presidency which were not covered were the Sundarbans, Hill Tippera and the Chittagong Hill tracts. Most of the excluded tracts were topographically surveyed during this period. This revenue survey is still the authoritative survey of the province, but its use for practical purposes is now greatly impaired owing to the fact that no provision was made at the time for permanently recording the village and estate boundaries then existing.

In 1888, the first district settlement under the Tenancy Act of 1885 began and in connection therewith cadastral maps were prepared and for many purposes take the place of the older revenue survey maps. By 1921-22 the area for which cadastral maps were available amounted to 56,180 square miles or 84 per cent of the area of the presidency to which the Tenancy Act applies. It is expected that this cadastral survey, which includes the main river beds and foreshores, will be complete by 1936.

4. THE CULTIVATOR.

The census of 1921 showed a population of 47,592,462 for the presidency as a whole giving a density of 579 per square mile. The variation in density ranges from 34 per square mile in the Chittagong Hill tracts to 1,148 in the Dacca district. The census of 1921 showed an increase in population over the presidency as a whole of 2·8 per cent as compared with the census of 1911, but that increase gives no true picture of the presidency in detail, for, in western and central Bengal, the population seriously declined during the decade, except in the immediate neighbourhood of Calcutta, while it increased by 2 per cent in the north and by no less than 8 per cent in the east.

Only a very small percentage of this population of 47½ million is urban; the proportion so returned in the census of 1921 was 6¾ per cent. The people of Bengal do not take kindly to town life and the urban population contains a large proportion of immigrants from other provinces. Agriculture is the direct means of support of no less than 77⅓ per cent of the total population of Bengal. Pressure of population on the land is great and it was calculated in the census of 1921 that each worker on the land had only 2·215 acres to cultivate. Like most averages this

is misleading to the extent that in parts of western and northern Bengal, where " dry " conditions prevail, holdings are often of considerable size, while, in the delta, they are frequently below the average. In western and northern Bengal, the holdings would benefit from consolidation. A Committee reported in 1925 on the possibility of taking action on the lines of the Punjab schemes. The Committee came to no decisive conclusion and suggested further enquiry as to practicability of consolidation generally, but recommended that, in the temporarily settled government estates, a start might be made at once and the Co-operative Department strengthened for the purpose. An officer in that department has now been placed on special duty with a view to organising consolidation societies on these estates.

There are two systems which govern the law of succession to property under Hindu law, namely the Mitakshara and the Dayabhaga. The home of the latter system is Bengal, while the former prevails over the greater part of India. Under the Mitakshara system, property is divided up into joint-family property and self-acquired or separate property. According to the Dayabhaga law, there is no right by birth in ancestral property, two or more persons inheriting property together become tenants in common, and not joint tenants. The Muhammadan law recognises the principle of the individual inheritance by the children of a certain proportion of the father's movable property and discards that of joint ownership or survivorship.

Where the holdings are of average, or below average, size it is not surprising to find that hired labourers (as distinct from casual hiring among the cultivators themselves) are few—there being in fact only one hired labourer to every five who cultivate land of their own—or that the standard of living is low. But the lot of the cultivator is not on that account necessarily wretched. Nature is bountiful throughout the deltaic area which is the typical Bengal. The cultivator can produce unaided and with a very moderate degree of work sufficient food to support himself and a surplus which will enable him to purchase the few articles not produced at home. If, as is often the case, his sole crop is rice, he has three months' hard work in March, April and May followed by nine months' leisure ; if his land is suitable for jute as well as rice, he will have an additional six weeks' work in July and August. He will grow fruit and vegetables and a little tobacco for his own consumption without much trouble round his house and he and his family, especially during the period of the rains from July to September, spend a good deal of their time fishing.

The Bengal Census Report for 1921 remarks that the word ' village ' in the sense in which it is ordinarily understood in India should not be used without qualification in respect of rural Bengal. Except in certain districts, the homesteads of rural folks are not crowded into some conveniently situated site. Each cultivator builds his homestead on his own land. Commenting on the absence of villages in Bengal in the ordinary sense, the Report points out how difficult it is to develop

corporate village life in such circumstances. It is significant that for administrative purposes in Bengal, a survey unit (*mauza*) takes the place of the village unit elsewhere.

The following extracts from the "Economic Life of a Bengal District" by the late Mr. J. C. Jack, I.C.S., give a vivid account of a 'village' in the delta. "There is no village street.....indeed, in the English sense of the word, there is rarely a village at all....in the older north the houses usually straggle at irregular intervals along the banks of the stream and are surrounded by orchards or at least by some garden and a few trees; in the south-western swamps the long line of homesteads is rarer..... giving place to the circular formation round a tank and the houses are fewer and very close together and the trees are very few....in the alluvial south east the land is too recently formed and too liable to be swept away to encourage the planting of a slow growing orchard. In all these villages, there is rarely a village road, usually a footpath leads from house to house, but often there is no path at all."

The cultivator invariably builds his own dwelling. To continue quoting from Mr. Jack's book "The homesteads do not display as much variety in construction or arrangement as might be expected on this account....on the average, they cover a quarter of an acre of ground.... although in the swamps where a plinth, sometimes 15 or 20 feet high, has to be raised, the space is very much smaller. Within this quarter acre will usually be found a pond, an orchard and a court yard, round which several huts with mat walls are constructed....a prosperous family builds larger huts and more of them; thus most cultivators in comfortable circumstances have five or six separate huts in their homesteads."

Chapter XII of Part I of the Bengal Census Report for 1921 refers the reader interested in the domestic economy of the cultivating classes to Mr. Jack's book, as containing "more reliable information of this character regarding a Bengal district than can be obtained anywhere else." In the next two paragraphs which describe that economy, Mr. Jack's analysis of the Faridpur district will, therefore, be closely followed. Faridpur is situated on the west side of the Dacca division and, so far as any one district can be, is typical of the conditions prevailing throughout deltaic Bengal.

About one-half of the cultivators can be considered to be living "in comfort"—which means that they are well fed, well housed and well clothed. Relatively very few are living "in want"—not, perhaps, more than 4 per cent of the total agricultural class—that is to say they are thin and ill-developed with old and worn clothing and live in tumbled down and ill-thatched huts. Of the remaining 46 per cent about 28 per cent can be regarded as below "comfort" and 18 per cent as above "want." In terms of money, this classification is based on an average annual income of Rs. 300 for a family of five * members living 'in comfort' and of Rs. 135 for a similar family living 'in want.' A similar estimate for the district of Mymensingh shows a

* 2 adult males, 1 adult female, 1 boy and 1 girl.

somewhat uneven distribution of annual income. About 4 per cent of the families annually obtain a net profit of Rs. 800 or more, 36 per cent Rs. 240 or more, and 60 per cent are considered to be on the subsistence level with no surplus of income over expenditure. The " in comfort " family, as classified by Mr. Jack, is estimated to consume a *maund* (82 lbs.) of unhusked rice per head per month—20 per cent above the standard calculated by the Famine Commission of 1880 for physical fitness—and will have in addition, partly by cash purchase and partly by home production, an adequate supply of salt, oil, spices, fish, vegetables, *ghi* and milk, tobacco, *gur*, betel nut, kerosene oil, clothes, household utensils and furniture. Utensils and furniture will be of a simple kind : close woven mats with a polished surface as covers for the floor, jars great and small for food, clothes and stores of all kinds (wooden receptacles are useless owing to the hot and damp climate and the ravages of insects), some brass plates and pots and a lamp or two, perhaps a few pictures. Rent and local taxation will have to be paid and money will from time to time have to be spent on miscellaneous items such as medical treatment or the purchase of cattle or a boat. There will also be house repairs to carry out and an occasional " voluntary " expenditure on domestic festivals and events. On all these objects, food and other necessaries (including " voluntary " expenditure which custom makes " necessary ") the " comfortable " family of five will, perhaps, spend about Rs. 250 out of its total income of Rs. 300. Any surplus cash the cultivator will probably spend on jewellery for his wife.

The family " in want " will have much the same range of expenditure but it will have to cut down its rice consumption by one-half, omit fish, and almost omit vegetables from its dietary ; it will keep no boat and no cattle and will spend very little on clothes. It will still spend, and must spend in the present state of social opinion, an amount absolutely small but relatively quite beyond its means on domestic festivals and entertainment.

The main dependence of the cultivator is naturally upon agriculture, but many cultivators, owing to the small size of their holdings, must have some additional means of livelihood. There is consequently a great deal of subsidiary employment, much of which is, however, of a trivial kind bringing only a very small addition to the annual incomes estimated above. The most common of them are menial and domestic service, weaving everywhere, and fishing in the deep water paddy tracts of eastern Bengal and the keeping of poultry in the Chittagong district. The Fisheries Department has been closed down as a measure of economy, though there is useful work to be done especially in eastern Bengal. Fishery rights are usually vested in landlords who lease them out to the middlemen. The fishermen are entirely dependent on these middlemen who absorb the main profits of the trade. Sericulture is also an important industry in some localities ; the possibility of fruit farming and lac culture also deserve attention. There is great scope in Bengal as elsewhere for a thorough survey of the economic and social possibilities of

these and other subsidiary occupations. There is a good deal of agricultural labour for hire at harvest time; much of this labour is performed by owner cultivators who prefer to do it outside their own districts. There is, therefore, where different times of harvesting the principal crops make the arrangement possible, a mutual exchange of labour between owner cultivators. The entirely landless labourer is still the exception throughout Bengal. While the proportion of those who engage in subsidiary occupations, especially of those who hire themselves out from time to time as labourers, is naturally higher among the poorer cultivators, it is by no means confined to them. The fact that it is not, is an instance of the homogeneity of the cultivators in Bengal.

Indebtedness is a problem among the cultivators of Bengal just as it is among their brethren all over India. The burden weighs most heavily on the classes intermediate between comfort and positive want. The cultivators who live "in comfort" are by no means free from debt, but as a class the amount of their indebtedness probably does not exceed what might be regarded as a justifiable overdraft, if only it were borrowed for productive purposes and at reasonable rates. Much of it is, however, borrowed to meet expenditure on domestic ceremonies and in particular on the occasion of marriages. A marriage in a family may often necessitate the entertaining of several hundred guests. Practically all of it is borrowed at high rates ranging from 36 to 48 per cent. The security is often jewellery. This domestic expenditure is not the kind that co-operative credit societies exist to finance. The loans so often contracted by the cultivator in kind, either for the purchase of seed or cattle or to buy food just before the harvest when his own food supply has run short, are of a different category. The provision of co-operative credit is the solution here, but, though much progress has been made in the last twenty years or so, a candid investigator is forced to acknowledge that, in Bengal as elsewhere, only the fringe of the problem of indebtedness has so far been touched in this way.

The cultivator is hampered to an unusual extent in Bengal by the poor quality of his cattle and the small size of his holding. Deltaic Bengal will probably always be a cattle importing region and, therefore, the main hope of improved cattle is an improvement of the supply imported from the north-west. Efforts are however being made to improve the local supply. The matter is further discussed in the section on the Agricultural Department.

The number of literates is everywhere low, varying from 5 to 15 per cent in the different districts (excluding Calcutta). In the principal cultivating castes the rate varies: among the Pods and Chasi Kaibarttas of central Bengal and the western delta it is as high as 13 per cent, but among the Namasudras, Rajbansis and the Muhammadan Sheikhs who are the cultivators of eastern and northern Bengal, it falls to 8, 6 and 5 per cent. This question is dealt with more fully under "Education" below.

If cultivation only occupies three to five months of the year, it may well be asked: How does the cultivator spend his time? The annual repair of his house, fishing and visits to relatives (for the Bengali cultivator is fond of travelling) occupy some part of it, but his most constant resource, when in need of diversion during the day time, is attendance at the neighbouring *hats* (weekly markets), of which there will often be as many as ten or twelve within walking or boating distance of his homestead. When he has no work to do, he may go to as many as 4 or 5 different markets in a week. The ordinary village in Bengal boasts no village shop, but the cultivator does not on that account ordinarily go to market to buy or sell. He makes it a social occasion where he meets his friends and learns the news. His boys, who will take a full share of any work to be done on the homestead after the age of 14 at latest, go to market with him and have additional resources for recreation in playing country games and, to an increasing extent, football and even cricket. In the neighbourhood of towns, where roads exist, the use of the motor bus is spreading, but, over much of the deltaic area, communication must be by boat for several months in the year and roads cannot be built.

5. THE AGRICULTURAL DEPARTMENT.

Although as a result of the recommendations of the Famine Commission of 1880 the nucleus of the Agricultural Department was started in Bengal in the year 1885, the department in its present form originated in the year 1906, when a Director of Agriculture with a staff of experts was appointed. A provincial agricultural college was opened at Sabour in Bihar in 1910. In addition to providing agricultural education for the sons of a limited number of landholders, this college was intended to provide trained men to supply the staff of the agricultural institutions in the province. The general policy in 1906 was, in the first place, to establish experimental farms at selected centres which would also be depôts for seeds, implements and manures, and then to bring home to the cultivators the results obtained on these experimental farms by means of demonstration farms which would be both smaller and more numerous than the experimental farms and would be temporary in nature as they would be opened at such places and for such periods as occasions would require. It was also proposed to foster the development of agricultural associations among cultivators.

The history of the expansion of the Agricultural Department in Bengal is complicated by the territorial changes referred to in the introductory section.

The position to-day as regards the strength and composition of the Agricultural Department is that, in addition to the post of Director of Agriculture, there are, in the superior service, five posts of deputy directors of agriculture, two of which have been left unfilled as a measure of retrenchment, one post of assistant director of agriculture with which is merged the post of fibre expert, one post of agricultural chemist, two posts of economic botanists and one post of deputy director of

sericulture. It should be noted that the Director of Agriculture is responsible for the preparation and issue of the forecasts relating to the jute crop and that the work entailed is considerable.

Receipts and expenditure in India of the Government of Bengal under 'Agriculture' for the ten years 1917-18 to 1926-27 are shown in the following Table :—

Year	Receipts	Expenditure
	Rs.	Rs.
1917-18	75,833	7,95,212
1918-19	1,08,280	9,47,088
1919-20	1,45,045	10,39,113
1920-21	1,36,308	10,84,440
1921-22	1,46,366	12,11,019
1922-23	1,20,486	12,44,596
1923-24	1,35,204	10,45,230
1924-25	1,26,969	10,18,709
1925-26	1,36,767	10,70,742
1926-27	1,56,237	11,97,222

For purposes of agricultural administration, Bengal is divided into three circles, eastern, western and northern. Each circle constitutes a deputy director's charge.

An outstanding feature of the present organisation for agricultural development in the province is the fact that there is no agricultural college around which the training in research and educational work can centre. The Sabour College which had continued to train staff for the Bengal Agricultural Department after the formation, in 1912, of the separate province of Bihar and Orissa, was closed in 1922 and so far no similar institution has been established in Bengal. Government have accepted in principle the establishment of an agricultural institute at Dacca with the object of training practical agriculturists with the necessary scientific equipment to enable them to take up the industry of agriculture on modern lines and of providing trained officers for the subordinate agricultural services. The scheme is an expensive one, involving an initial expenditure of some ten lakhs of rupees, and, in the present state of the provincial finances, it has not proved possible to proceed with it.

In consequence of the acceptance of the recommendations of the Lee Commission, recruitment for the Indian Agricultural Service has ceased. Other arrangements will, therefore, have to be made by the provincial Government for filling the superior posts in the future, but no decision as to the nature of these arrangements has yet been reached.

Below the superior posts mentioned above are (1) the Bengal Agricultural Service, (2) the Subordinate Agricultural Service and (3) the Lower Subordinate Agricultural Service for demonstrators.

The Bengal Agricultural Service consists of thirteen appointments on a scale of Rs. 200 to Rs. 750 per month, in which are included three special posts of superintendents of sericulture. These officers are

directly subordinate to the deputy directors of agriculture. The first assistants to the three experts, namely, the assistant fibre expert, assistant agricultural chemist and assistant economic botanist are also included in this service.

The Subordinate Agricultural Service is divided into two classes. In the first class are the laboratory assistants to the three expert officers mentioned in the preceding paragraph, the entomological, mycological and bacteriological assistants, and the district agricultural officers. These district agricultural officers have almost all received training at an agricultural college, supplemented by a practical course at the Dacca farm. Their duties are of an administrative nature. The scale of pay for this class is Rs. 125 to Rs. 300 per month, but the laboratory assistants and other assistants start on Rs. 160. In the second class are included the assistant farm superintendents, overseers and assistant masters of the secondary agricultural school at Dacca. Their scale of pay runs from Rs. 50 to Rs. 135.

The demonstrators in the Lower Subordinate Service are drawn either from the cultivating or the *bhudralog* class. Their training in the past has been defective, but, for the future, attendance at the Dacca Agricultural School will be a necessary qualification for entrance and men already in the service are now being put through a course of special training on the Dacca farm at the rate of ten to twelve a year.

The district agricultural officers and demonstrators, who are the channels through whom the Agricultural Department spreads its information, number at present 33 and 80 respectively. Administrative sanction has recently been obtained to increase the number of agricultural officers to 40. Before the Bengal Retrenchment Committee's recommendations were acted on, there were 63 agricultural officers and 160 demonstrators. The new superior appointment of assistant director of agriculture is meant specially to enable control to be exercised over these propagandist officers.

In the absence of an agricultural college, the research and experimental work of the department centres round the Dacca farm where also the training of subordinate agricultural officers is being carried out. The farm comprises an area of about 350 acres with an adjacent area of 300 acres acquired for the projected agricultural institute. The site of the farm is typical "old alluvium", a type of red soil, and is split up into alternate high land and paddy land. The farm is the headquarters of the Department of Agriculture and the chemical, botanical and fibre sections are housed there. Important work is being done on jute, rice and fodder crops. In Japanese millet, which is ready for cutting six weeks after sowing and matures seed within two months the department hopes that a valuable catch crop has been secured and it is on such catch crops that reliance must be placed for the better feeding of cattle, until irrigation on a large scale is provided. Artificial farm yard manure is made on a large scale. In 1926-27, three thousand *maunds* of this material were prepared from refuse straw,

sugarcane trash and weedings, with the addition of cattle urine, byre washings and a little bonemeal. Experiments in connection with silk worm rearing are also being carried out, especially in regard to the method of cultivation calculated to produce the maximum amount of food from mulberry.

A tube well is about to be sunk on the farm which, if successful, will enable investigations into the value of irrigation to be carried out.

In addition to the Dacca farm there are a number of other farms at which experimental and demonstration work is being conducted. In particular, important work is being done on the farms in the districts of Birbhum and Bankura with special reference to the problems relating to western Bengal. It is being demonstrated on both these farms that by terracing and drainage the upper slopes can be made to grow crops of cotton, millet, maize, etc., where before only precarious crops of rice were attempted. At the Burihat tobacco farm important experiments are being conducted in regard to the production of better grades of tobacco.

In addition to farms on which experimental work is carried out, there are a number of district agricultural farms opened subsequent to 1919-20 when the Government indicated that it was their policy to establish a demonstration and seed farm in each of the districts for the double purpose of testing the suitability to local conditions of the results of scientific experiments at the central research stations and of taking up the study of purely local problems. These farms are quite small in area. One interesting feature is that some portion of each farm is set aside to be run on economic lines with a view to bringing home to the public that agriculture on the lines recommended by the department can be made to pay. It was also the declared intention of the policy adopted in 1919-20 to interest the district boards in these district agricultural farms. The number of district farms so far established is nineteen. In addition to the farms managed by the Agricultural Department an interesting experiment has been made in the Mymensingh district by the setting up of two small farms in 1923 and 1924 at Kishoreganj and Jamalpur where the actual cultivation is carried on by cultivators under the direction of a farm superintendent, the cultivators being supplied with departmental seed for paddy, jute and sugarcane on condition that an equal quantity is returned after harvest in addition to the departmental share of the produce. The Kishoreganj farm, which has now been running for 3 years, is said to be a conspicuous success. The area of the farm is 83 acres. The multiplication of such inexpensive farms is being considered. The Agricultural Department regards it as probable that, in the near future, many *khas mahal* and Court of Wards estates and also some private estates will establish similar small demonstration farms.

Since 1922, the propaganda work of the department has mainly been carried out through the district farms. In 1923, it was decided to make the district farm the centre round which not only agricultural officers but also district and co-operative officers as well as non-official workers could gather for demonstrating agricultural improvements.

It is recognised, however, that the cultivator himself will seldom come to the farm in search of information and that the information which the department is ready to give out must be taken to him. This is the work of the district agricultural officers who, in the past, have been posted only to districts with departmental farms in order that their work in carrying out demonstrations at various fixed centres, of which there are a considerable number, might be properly extended. It has recently been decided to extend the postings of these officers to progressive districts which are without farms, as they will be now under the efficient control of the Assistant Director of Agriculture.

The work of the Agricultural Department is much assisted by the existence of forty private farms in the Presidency and Burdwan divisions and sixty farms in the Rajshahi division. These farms all grow strains of seed selected by the Agricultural Department; they do so because these strains are more profitable and each farm becomes, therefore, a demonstration centre, all the more effective because it is non-official.

In addition to these 100 private farms, there are 200 paddy seed farms under private management which have grown up as a result of the practical experience of departmental recommendations.

The special arrangements made by the department for the sale of the seed of improved varieties of jute are of interest. In 1925 the burden had become too heavy for the limited staff of the department and a government agent was appointed for the sale of jute seed. The department continues to control the amount of seed produced and tests its purity. The price at which the seed is to be sold is also fixed by Government. The arrangements are said to be working well. In 1926-27 a contribution of Rs. 20,000 was received from the London Jute Association for promoting the extension of the area sown with improved varieties of seed produced by the department.

Reference was made in the beginning of this section to the intention, as part of the agricultural organisation of 1906, to foster the development of agricultural associations among the cultivators. The part, however, that they have played over the last twenty years in agricultural development has, on the whole, been disappointing. Both the Presidency and Burdwan divisions have divisional agricultural associations to each of which the Government contribute Rs. 1,000 per annum and there are subdivisional and district associations below them. But some good observers doubt whether this organisation of associations has any real vitality. It is certain that, where it achieves success, success is found to depend almost entirely on the driving force of one or two members and does not spring from corporate action. A suggestion has been made that organisation should come from below rather than above and that the union board and the circle officer, who supervises a group of union boards, should be invited to assist in such activities as distributing seed of improved crops. The policy is to work from both above and below, to keep divisional and district organisations alive, whenever possible, and to see that smaller units are also organised which may tend,

by revealing local needs, to keep the larger organisations in touch with realities. If the organisation of smaller units is successful, whether it is accomplished through union boards and circle officers, co-operative associations, or in some other manner, the larger organisations would have their part to play in bringing these local needs to the attention of Government and of urban sympathisers.

Among a population so large and an area so great as Bengal, it is not easy to estimate the precise extent of the influence exercised by the Agricultural Department. If many problems, including those of the dry lands of western Bengal, have had for want of men and money to be left temporarily on one side, substantial results in the deltaic area have undoubtedly been achieved. Improved varieties introduced by the department are now grown on a commercial scale over a wide area and were estimated in 1925-26 to bring in to the cultivator an increased return of two crores. Such figures are always open to challenge and ought never to be accepted as more than a rough estimate. But it is certain that in large tracts of Dacca, Faridpur, Rajshahi and Rangpur practically none but improved departmental jute is now grown, that the *tanna* sugarcane recommended by the department has almost entirely superseded local cane in the Burdwan district and that the department's improved strains of *aus* rice are now well known. The value of bonemeal for transplanted paddy and the benefits to be derived from the judicious use of phosphate, lime, potash and sulphate of ammonia on certain crops in certain soils are now also becoming known, thanks, in part at least, to departmental efforts.

In Bengal there is no tract in which the cattle can be described as being essentially different from those of any other tract, except that there is a difference in size between the cattle of the eastern and those of the western districts. The cattle of the former tract approximate in character to the cattle of Assam, while those of the western Bengal districts are more like the cattle of Bihar. In addition to their diminutive size, Bengal cattle can be easily distinguished from up-country breeds by the smallness of the dewlap and the sheath. To a large extent the needs of the province are met by importation of cattle from outside. The proportion of imported bullocks is usually highest in the largest jute growing areas. Fewer milch cows are imported than bullocks. The imported animals nearly all come from Bihar and the United Provinces to the principal cattle fairs which are generally held during the winter months. The price of a local bullock varies from Rs. 15 to Rs. 60 and of an imported bullock from Rs. 50 to Rs. 150. The price of cows is usually expressed in terms of their milk yield *per diem*; thus a cow is said to sell at Rs. 20 to the *seer*. Rinderpest is a great scourge and accounted, in 1926-27, for 93 per cent of the total mortality. Inoculation by the serum-alone method was carried out on a large scale, over 206,000 head of cattle being treated.

The reports of the Bengal Agricultural Department show that the question as to the steps to be taken for the improvement of the cattle of the province have been under discussion for many years.

According to the Bengal Cattle Survey of 1915, the average yield *per diem* of a Bengal cow is not more than one *seer*. The deficiency of fodder is considered to be one of the principal reasons for the degeneration of cattle, but improvement in feeding cannot be brought about until the cultivator realises that without better feeding he cannot hope to have better cattle.

There are two cattle breeding stations, one at Rangpur established in 1914 and the other at Dacca established in 1920. At Rangpur, there are two herds, one raised by selection from Bengal stock and the other a cross between Hariana and Bengal cattle. The animals on the Rangpur farm had been inoculated by the serum-simultaneous method prior to the outbreak of 1925-26 and remained altogether immune to rinderpest. At Dacca there is a herd of pure Sindhis. The standard of rejection for cows in all the herds is 2,500 lbs. per lactation of 300 days and it is hoped to raise it still further to 3,000 lbs. Dairying is a subsidiary activity of the Rangpur farm. A livestock officer under the Agricultural Department has now been appointed and it is hoped that a more vigorous and connected policy in cattle breeding may begin. The Sindhi herd is considered most promising and Government have sanctioned its expansion. Government have also approved the distribution of stud bulls through the agency of co-operative breeding societies and recognised bull keepers.

The interest of the Government in the subject of sericulture dates from 1886, and in 1896, *i.e.*, ten years before the Agricultural Department in its present form came into being, the local Government were opening centres conducted on scientific principles for the improvement of silkworm strains and the training of rearers. In 1898, the Bengal Silk Committee was established and Government allocated to the Committee the subsidy which they had hitherto given to the silk factories of Murshidabad. Progress was somewhat disappointing and a special Committee was appointed in 1906 to enquire into the condition of the silk industry in Bengal and, as a result of its recommendations, the Agricultural Department took up sericultural operations from April 1908 and has since continued the work. A new Bengal Silk Committee was formed and now consists of six official members and ten non-official members with the Director of Agriculture as *ex-officio* president of the Committee; the non-official members represent the silk trade both European and Indian and the cocoon rearers and silk weavers. The work of the Sericulture Department is carried on under the administrative control of the Director of Agriculture with the assistance of a deputy director of sericulture who has under him three superintendents between whom the silk districts of Bengal are divided. There are six central and six small nurseries engaged in the production of pure seed cocoons for sale to rearers and in pure line selection of indigenous races of silk worms. The present programme is to raise improved seed for distribution to the extent, it is hoped, of about 25 per cent of the total demand, to supervise the work of raising seed by private agency, to carry out demonstration and propaganda work and to give practical training to the sons of silk rearers.

6. THE VETERINARY DEPARTMENT.

Turning to veterinary work in the province, we find that veterinary education in Bengal started so long ago as 1893 with the establishment of a school which was subsequently raised to the status of a college in 1899. This college, which is situated in Calcutta, is in a flourishing condition. In 1926-27 it had 125 students of whom only 32, however, came from Bengal. Of the remainder, no less than sixty-six came from Bihar and Orissa, nine came from Assam, eight from Mesopotamia and the remaining ten from various parts of India. The number of students from Bengal proper showed recently a marked falling off, occasioned by the absence of prospects of appointments under district boards and by the stoppage of stipends granted by Government in pursuance of the recommendations of the Bengal Retrenchment Committee. The new veterinary college which is being established in Bihar and Orissa must have a very marked effect on the fortunes of this college unless an increased number of students is obtained from the presidency. This may happen, as stipends have been re-introduced from the 1927 session and an increased entry of students has already resulted.

The Veterinary Department, which is independent of the Agricultural Department, is organised as follows. There are three superior appointments, *viz.*, that of Director, Civil Veterinary Department, Bengal, and Veterinary Adviser to the Government of Bengal (one appointment), the Principal and the vice-Principal of the Veterinary College. These are filled by officers of the Indian Veterinary Service, recruitment for which ceased in 1924 in consequence of the recommendation of the Royal Commission on the Superior Civil Services in India. Its place will be taken by a Superior Provincial Veterinary Service. Below these officers are the assistant directors, and the assistant principal and lecturers at the Veterinary College who are members of the existing Provincial Service on the same scale of pay as the Provincial Agricultural Service, *viz.*, Rs. 200-750 per month. At present there are eight posts in the Provincial Veterinary Service and all of them are filled. Finally, there is the Subordinate Service consisting of 8 inspectors and 123 veterinary assistant surgeons. The inspectorate is filled by the promotion of senior and efficient veterinary assistant surgeons.

There is no Animal Diseases Act in Bengal nor is there at present any clear-cut separation of the contagious diseases staff from that for ordinary veterinary work. Both sets of duties are carried out by the veterinary assistant surgeons. The control of contagious disease is a direct responsibility of the Director, Civil Veterinary Department, except in Calcutta and its neighbourhood where the working of the Glanders and Farcy Act is in the hands of the Principal of the Veterinary College. His staff in the main consists of the veterinary assistant surgeons who in respect of their ordinary work are employed by district boards under an arrangement whereby the district board pays two-thirds of the officers' costs. These veterinary assistant surgeons are for disciplinary purposes under the ultimate supervision and control of the Director.

In addition to the hospital attached to the Veterinary College in Calcutta, where 2,562 cases were treated in 1926-27, there were in that year 45 dispensaries maintained in the districts which treated 56,184 cases. There are no itinerating dispensaries, but there are a certain number of itinerant veterinary assistant surgeons in connection with the supervision of contagious disease and these officers treat any cases of ordinary illness which may come to their notice, carrying a small box of medicines with them and, for any additional requirements, prescribing drugs which they know to be available in the local bazaar. When the veterinary assistant surgeon is energetic and resourceful, he undoubtedly does much good in treating cases which would never be brought to the infrequent district dispensaries.

7. IRRIGATION.

The problems presented by water in Bengal are now acknowledged to be of great importance alike to the welfare of the people and the development of agriculture. It is admitted also that little has as yet been done to seek for solutions. It might be thought that, in a province where the rainfall averages from 50 inches to 120 inches and more, annually, irrigation would not be required. But this is by no means the case. An increase of the fodder supply is, for example, most important and this must be obtained without any corresponding diminution of the present human food supply. This can only be secured by cultivation of fodder crops during the dry months and for this irrigation is required. Moreover, the cultivator on his small holding needs subsidiary occupations if his standard of comfort is to be raised ; there can be no better way of achieving this than by turning areas of once—cropped into areas of twice—cropped land.

The present Irrigation Department, which was separated from the Public Works Department in 1921, is charged with the following multifarious duties : irrigation proper, flood disposal, regulation and training of tidal and non-tidal rivers, anti-malarial and sanitary drainage, and navigation. Only the agricultural aspect of irrigation will be dealt with here.

There are two canals in use at present for irrigation purposes, the Midnapore and Eden canals. The Midnapore Canal is 69 miles long and irrigates, through 287 miles of distributary channels, an area of 75,000 acres. The Eden Canal is a small work irrigating 23,000 acres.

There is only one scheme of any importance at present under construction, that for taking off water from the Damodar river in the Burdwan district. This new canal will irrigate nearly 200,000 acres of paddy in the Burdwan and Hooghly districts, including about 22,000 acres now irrigated from the Eden Canal. A small scheme, the Bakreswar Canal, is under construction in the Birbhum district. In a few districts, attention is being given to the improvement of existing water-channels ; but, in the absence of comprehensive surveys of the large rivers and other water courses, progress is difficult.

Important changes affecting the distribution of the available water supply have taken place in western Bengal within comparatively recent

times. The unfavourable nature of these changes is reflected in a decline of the population due in part at least to the drying up of tanks and reduction in the subsoil water level making impossible over large areas the intensive cultivation of forty to eighty years ago. There is undoubtedly scope for conserving the waters of small streams and the natural rainfall by constructing flow irrigation channels and increasing the number of tanks. The situation is specially serious in the districts of Burdwan, Birbhum, Bankura and Midnapore.

In two out of these four districts, Bankura and Birbhum, the people have begun to help themselves and marked progress is being made in co-operative irrigation, chiefly in the direction of the excavation of new, and the re-excavation of old, tanks and the building of irrigation embankments for the storage of water. The first society was started in the Midnapore district in 1916, and in 1926 the societies numbered 350 with a total membership of 12,092. In Bankura, in 1926 they controlled a total irrigable area of 16,870 acres and had a working capital of Rs. 1,69,326. In Birbhum, the corresponding figures were 6,687 acres and Rs. 54,765.

A special officer was posted by Government for some time to the Bankura and Birbhum districts to advise co-operative societies and other agencies undertaking schemes under the Agricultural and Sanitary Drainage Act of 1920. Recently, special irrigation subdivisions have been created in both these districts to deal with minor irrigation schemes whether they are carried out departmentally or under the Act of 1920.

Wells are a responsibility of the Agricultural Department and provision has been made for the appointment of an agricultural engineer whose special duty it will be to investigate possibilities of well irrigation and of water-lift. There is scope for well irrigation in the districts round about Calcutta for the cultivation of the potato and also in some parts of west and north Bengal, for the cultivation of tobacco. In west and north Bengal the fragmentation of holdings is an obstacle to well sinking. Very few wells have so far been sunk and practically all of them have been of the open type. The few tube wells which exist have been installed in order to obtain uncontaminated drinking water, and so to prevent cholera.

8. FORESTRY IN RELATION TO AGRICULTURE.

The forests of Bengal lie mainly along the Himalayas in the north, the Sundarbans in the south, and in the Chittagong district and Chittagong Hill tracts in the south-east. They exercise, therefore, but little influence on the agriculture of the province generally. The total area of forest under the administration of the Forest Department is 10,600 square miles. 6,283 square miles are returned as closed to grazing and grass cutting, 877 square miles are open to both, and over 1,837 square miles grass cutting only is allowed.

From the point of view of agriculture, it is the *zamindari* forest tracts of western Bengal in the Bankura and Midnapore districts which most claim attention. Here there is a steady recession of *sal* (*Shorea robusta*) forest due to over-cutting and the evil results in the violent flooding of streams and the consequent deterioration of adjacent land owing to

burial under hill detritus are already much in evidence. Re-afforestation is urgently required in a few areas; and conservation of still existing forest by lengthening the period of rotation for cutting (at present only three to four years) is everywhere desirable. But it is not easy to convince the villager who needs fuel and the proprietor who needs cash that temporary self-denial will be more than repaid later on. An officer of the Forest Department has recently been placed on special duty to investigate these problems of deforestation and erosion. It is possible that regeneration of scrub jungles in the neighbourhood of villages may be effected through village co-operative societies and such societies have been started as an experiment in the district of Bankura.

Although not under the Forest Department, it is relevant to notice here that some 3,153 acres are under cinchona. Considerable difficulty is being experienced in securing suitable soil for further extension.

9. GENERAL EDUCATION.

The first attempt to reorganise the indigenous primary schools known as *patsalas* was made in Bengal in the early part of the nineteenth century largely through the initiative taken by some of the Christian missionaries. In 1814, one Mr. May started a primary school in Chinsurah and four years later at the time of his death there were 36 such schools attended by about 3,000 pupils both Hindus and Muhammadans. This pioneering work in primary education in Bengal attracted the attention of the East India Company who granted a monthly sum of Rs. 600 towards the maintenance of the primary schools. Although, in various despatches of the Government of India, great emphasis was laid from time to time on the need for primary education in rural areas, the demand for higher education became so great that from the middle of the nineteenth century onwards the growth of higher education has been out of all proportion to that of primary education in the presidency. During the past six years, for example, government expenditure on university education has increased by fourteen lakhs while its expenditure on primary education over the same period has increased by four lakhs only.

The total expenditure on public instruction in 1926-27 was Rs. 397 lakhs as compared with Rs. 309 lakhs in 1920-21. This total expenditure was met from the following sources :—

	Provincial revenues	District funds	Municipal funds	Fees	Private sources
	Rs. (lakhs)	Rs. (lakhs)	Rs. (lakhs)	Rs. (lakhs)	Rs. (lakhs)
1926-27	148	16	6	162	65
1920-21	109	14	2	135	49

Of the expenditure in 1925-26, 37·28 per cent came from government funds, 4·03 from board funds, 40·81 from fees and 16·37 from other sources.

In 1927, the proportion of boys of school-going age in primary schools was 37·1 per cent and of girls 11·7 per cent. The percentages of literacy for persons of 20 years of age and over returned at the censuses of 1911 and 1921 are as follows:—

		Male	Female
1911	..	19·9	1·3
1921	..	22·5	2·1

In the following Table are given particulars of the institutions, scholars in attendance and cost per head of each pupil:—

Kind and number of institutions	Number of pupils	Percentage at each institution	Cost per pupil per annum
			Rs. a. p.
2 Universities	....	....	....
41 Arts Colleges	22,131	1·15	152 12 5
14 Professional Colleges	6,281	0·33	355 0 0
1,003 High Schools	238,461	12·38	38 2 10
1,690 Middle Schools	147,486	7·65	16 4 6
38,197 Primary Schools	1,399,535	72·64	4 0 9
3,166 Special Schools	112,720	5·85	26 12 11

Of the two universities, Calcutta is still mainly an examining body, but it has now made itself responsible for advanced teaching for which purpose it has a staff which is in the main distinct from the staff of the affiliated colleges. The Calcutta University Commission advocated a Faculty of Agriculture and a university course in agriculture. The university has not yet seen its way to adopting these measures, but it now possesses a Chair of Agriculture. The Matriculation Regulations Committee which reported in 1925 recommended, *inter alia*, that candidates should produce a certificate that they had received training for a specified period according to a prescribed syllabus and under an approved teacher in at least one of a number of 'practical life' subjects of which agriculture and gardening was one. The University at Dacca is of the residential type but has so far made no provision for higher agricultural education. It should be mentioned, however, that the late Kumar Basanta Kumar Roy bequeathed Rs. 2½ lakhs to Government for the benefit of Rajshahi College, a college maintained by the Government and affiliated to the Calcutta University. Subject to the creation of one small scholarship, the whole of this munificent donation is to be used for the promotion of advanced instruction at the college in zoology, botany and other scientific subjects and, if possible, a higher course of instruction in agricultural subjects, including dairy farming and cattle breeding, is also to be given. A scheme for utilising this endowment is now under consideration.

The arts colleges prepare students for university examinations. Intermediate colleges of the type recommended by the Calcutta

University Commission in 1919, *viz.*, an institution which shall bridge the period between high school and university studies, have as yet only been established at Dacca where there are three, two for men and one for women.

The Commission also recommended the introduction of agricultural courses and an improvement of the facilities for the study of the sciences which underlie agriculture. But these measures must no doubt await the general establishment of intermediate colleges. At present, in the words of the Director of Public Instruction : " The higher educational system of Bengal still remains almost unrelated to the rural economy." In so far as measures establishing relationship must involve expenditure, it is, indeed, arguable that to take them before improvements are effected in primary and secondary education would be to put the cart before the horse.

Passing over the professional colleges which have, at present, no direct interest for the rural population, we reach, in descending the educational ladder, middle and primary schools, the efficiency of which is of such critical importance to the cultivator.

As regards primary schools, unfortunately all the witnesses are agreed that efficiency is at present far to seek. The average number attending each school is only 30 to 40, the vast majority of the schools have only one teacher, and 78 per cent of the numbers enrolled never get beyond the first two classes and never achieve literacy. This is not the time and place to discuss remedies for a state of affairs which is not by any means peculiar to Bengal. The Resolution on Primary Education published by the Government of Bengal on 25th September 1926 and the evidence offered by the Director of Public Instruction and the Principal of the Teachers' Training College at Dacca may be consulted by those who wish to make a closer study of the present state of primary education in Bengal and of the measures that must be taken, if the policy admirably expressed in the Government of India Resolution of 11th March 1904 is to be attained : " the aim of rural schools should be not to impart definite agricultural teaching but to give the children a preliminary training which would make them intelligent cultivators, would train them to be observers, thinking and experimenting in however humble a manner and would protect them in their business transactions with the landlords to whom they pay rent and the grain dealer to whom they dispose of their crops."

Some reference should, however, be made here, on account of its critical importance, to one of the measures for improving primary education, *viz.*, the introduction of the compulsory principle.

Although free and compulsory education has long been a subject of considerable discussion, no sustained efforts have been directed to realise the ideal. In May, 1919, the Bengal Legislature passed an Act endorsing the principle of compulsory education but, partly through the fact that the Act was permissive in character and largely on account of financial reasons, only one local authority, the Municipality of Chittagong, has so far availed itself of the provisions of the Act. The scheme of free and

compulsory education submitted by this municipality was sanctioned in September 1927.

As it was realised that the introduction of self-government without giving the people the benefits of a free primary education in rural areas may result in failure, a Primary Education Bill for rural areas was prepared in 1925-26 and a Government Resolution issued endorsing its principles.

The text of the Bill has now been circulated for the information of the public. The sanction of the Governor General has been obtained and it will be introduced in the Bengal Council at the first favourable opportunity. The Bill provides for the constitution of district school boards to which management of schools in each district will be entrusted. The powers conferred upon the school board are very wide and its constitution is designed to make it a most important local body.

Finance has been the chief obstacle to the spread of primary education in Bengal. Provision, therefore, has had to be made in this Bill to raise money by a special cess for education. It is proposed to levy the cess at the rate of five pies on each rupee of annual rental value of land and of annual net profits from mines, quarries, tramways, railways and other immovable property. It is interesting to note that Lord Stanley, Secretary of State for India, in his Education Despatch of 1859 first mentioned and approved of a cess on land for education. In addition to the proceeds from this cess, the school boards will receive grants-in-aid.

Notwithstanding many discouraging factors there is a growing desire for education among the people themselves, the most striking indication of which is, perhaps, to be found among the Namasudras of Bengal. They represent a "depressed" section of the population numbering about two millions. Many of their schools are organised by their own efforts. The Seventh Quinquennial Review states that in the Dacca division, where they are specially numerous, one in twenty of the total population of Namasudras is at school. There are other backward communities in Bengal among whom the desire of education is no less conspicuous.

Coming to secondary education there are, as has been seen, 1003 high schools attended by 238,471 pupils and 1,690 middle schools with a membership of over 147,000. It is at this stage that educational opinion in Bengal, as elsewhere in India, has been most exercised as to the proper course to pursue. The Director of Public Instruction voiced that opinion when he stated in his evidence that the present system of secondary education in rural areas, if it had done little harm to agriculture, had certainly done little good. Its tendency up to the present has admittedly been to draw the best of the rural population areas away from the country instead of equipping them for life in it. Granted, however, that the system certainly needs modification to bring it into some relationship with the life of the country, there has been considerable hesitation in Bengal, as elsewhere, in the last ten years as to what form this modification should take.

The first definite step taken was to accept for Bengal the recommendation of the Conference on Agricultural Education held in Simla in 1917 that one or two vernacular agricultural schools should be established in each province with the object of providing instruction for the sons of cultivators without arousing in them a distaste for rural life. A school of this type was accordingly opened at Dacca in 1920 and a second school was opened at Chinsura in 1921. Such purely agricultural schools had the defect, nowhere more serious than in Bengal, of depriving the boy of his chance of a high school and university career. No parent would risk the career of a promising boy in this way. But time was hardly given to enable this defect to disclose itself in the case of Dacca and Chinsura, for it was decided, as the result of discussion of the whole subject of agricultural education at the meeting of the provincial Board of Agriculture in August 1921, to convert these schools, as part of a bigger scheme for agricultural education, into agricultural high schools with a view to training (1) departmental demonstrators, (2) agricultural teachers and (3) sons of zamindars to farm their own lands on modern lines.

Financial stringency, however, caused the bigger scheme to be held in abeyance and, on the advice of the Bengal Retrenchment Committee, Chinsura School was closed in 1924 as, owing to the absence of immediate prospects of government employment, the number of pupils had declined. It is intended, however, to maintain the agricultural school at Dacca and to make attendance at it a necessary qualification for appointment as a demonstrator in the Lower Subordinate Agricultural Service. The school is also to be used for the training of teachers of the new agricultural classes which are to be started in the middle English and high schools to which reference is made below. The course at the school lasts for two years.

Informed popular opinion, however, continued to press for the introduction of some vocational element in education above the primary level and, in 1922, the Bengal Unemployment Committee stressed in their Report the importance of introducing agriculture into education with a view to popularising it as a profession among the educated middle classes. Accordingly, in 1924, a Conference of official and non-official agriculturists and educationists was convened. This conference passed two resolutions supporting the teaching of elementary agriculture combined with practical work in the field. Reference has already been made to the recommendation of the Matriculation Regulations Committee which is yet another expression of informed opinion that education in Bengal must be brought into touch with economic realities.

One important outcome of the resolutions of the Conference of 1924 was the appointment of a Committee to investigate the possibilities of introducing agricultural classes in middle schools in Bengal on the lines so successfully started in the Punjab and subsequently adopted by Bombay and the United Provinces. Bengal had already, indeed, two schools with agricultural classes of the Punjab type, one of which at Amarpur

had been, and is, a great success; the Committee, after seeing the schools in the Punjab and having regard to the success of the school at Amarpur had no hesitation in recommending the initiation of a regular programme of opening agricultural classes with small farms attached to them in middle English and high schools (vernacular middle schools hardly exist in Bengal). The Committee's recommendation has been sanctioned and the training of teachers has just started. There are already eight schools with such classes in Bengal, but they were started independently of this scheme.

It has also been decided recently to start, as an experimental measure, three purely vocational elementary schools in selected rural areas to provide practical instruction in agriculture after the completion of the primary course and when the boys have already acquired some experience of work on the land.

Any reference to education in India would be incomplete, if it did not draw attention to the importance of female education. The spread of literacy among the women of rural Bengal is the essential preliminary to the solution of many problems. It is from the growth of higher education among women, with the consequential social enlightenment and freedom in all directions which will accompany it, that aid must be looked for in staffing the greatly increased number of primary schools which will be required if the campaign against general illiteracy is to achieve success. The figures in the Table below indicate how much has still to be done before the state of female education can be regarded as satisfactory.

Female population (male population in brackets)	Percentage of scholars to total population (percentage of male scholars in brackets)	Percentage of literacy (20 years and over) (percentage of male literacy in brackets)	Percentage of expenditure from all sources to expenditure on male education	Distribution of female scholars among educational institutions		
				Higher	Secondary	Primary
22,500,000 (24,151,000)	1·88(7·94)	2·1(22·5)	12·7	384	19,206	396,410

These figures show very clearly that the typical girls' school is the primary school. Moreover, it is estimated that over 73 per cent of the total number of the girls at school are withdrawn before they achieve literacy. Only in a few of the larger centres of population does secondary and collegiate education exist for girls at all.

It has been the experience of Europe and the United States that the success of a system of primary education is largely dependent on a supply of women teachers. Unfortunately, it is not only lack of education which makes it impossible to draw on women as teachers. A recent Report of an unofficial Commission of Enquiry on Village Education in India stated :—

"The social difficulties which so militate against an adequate supply of women teachers are well-known, and are immensely serious for the welfare of the country. All the primary school work in the villages is pre-eminently women's work, and yet the social conditions are such that no single woman can undertake it. The lack of women teachers seems to be all but insuperable except as the result of a great social change."*

But it would not be right to close on a note of despair. While the problem is vast and the forces of social inertia still very strong, the subject of female education attracts year by year greater attention. The Bengal Women's Educational Conference of 1927 is a bright omen of future possibilities. All those interested in the subject should consult the Report of that Conference which passed resolutions condemning the present state of the primary education of girls in Bengal as "acutely unsatisfactory" and commenting on the inadequacy in regard to number, equipment and staff of the present institutions for women teachers.

10. CO-OPERATION.

As elsewhere in India, co-operation took definite form in Bengal with the passage of the first Co-operative Credit Societies Act in 1904. The first Registrar of Co-operative Societies was appointed in that year and, by the end of 1904-05, sixty-seven societies had been instituted.

By the end of June 1926, these 67 primary societies had grown to 12,819 with a membership of 453,031. Of these societies no less than 11,672 were agricultural, consisting of 11,136 credit and 536 non-credit societies.

The working capital of these 12,819 societies amounted to Rs. 7·52 crores. Excluding the amount which is counted more than once owing to the separate treatment of the funds of the Provincial Bank, the central banks, and primary societies, the actual cash employed in the movement amounted to Rs. 4·23 crores during the year. Of these resources, the agricultural credit societies held Rs. 2½ crores as working capital. To this sum, share capital contributed Rs. 20 lakhs, members' deposits Rs. 9¼ lakhs and reserve fund Rs. 33¼ lakhs, the balance being made up mainly by loans from central banks, which amounted to Rs. 1¾ crores.

It is of interest to note that the societies have spread throughout the presidency, but that the movement is exceptionally weak in the districts of Bankura, Howrah and Hooghly. In the hill districts of Darjeeling and Jalpaiguri and to a lesser extent in Chittagong district, the movement has not yet made much progress.

In addition to these 12,819 primary societies, there are 98 central banks to which 11,152 of the primary societies are affiliated, and at the apex there is a provincial bank with a working capital of over Rs. 75 lakhs.

The government staff now assisting the movement consists of one registrar, his personal assistant, five assistant registrars (one for each of the five commissioners' divisions), one chief auditor, four divisional

* Village Education in India, 1922, published by the Oxford University Press,

auditors and 98 auditors, and 76 inspectors (including ten temporary inspectors of irrigation societies and one temporary inspector for the organisation of societies for the consolidation of holdings). The chief duties of the department are registration, supervision and audit, enquiry and inspection under Sections 35 and 36 of the Co-operative Societies Act of 1912, arbitration of disputes and liquidation of societies.

The officers of the department with the greatest responsibility for the success of the primary credit societies are the inspectors and auditors. The inspectors have hitherto been recruited by nomination by the Registrar, with the approval of Government, from among university graduates or by promotion from the rank of auditors. They will, in future, be recruited on the results of a competitive examination subject to the reservation of one-third of the vacancies to be filled by promotion from the rank of auditors. The duties of the inspectors are to assist the central societies in maintaining supervision over the field staff. They also have to satisfy themselves that the primary societies under each central society are receiving proper attention in regard to inspection and audit, and they have to carry out personal super-audits of a certain percentage of the societies and test the work of the auditors. They also act as arbitrators in disputes and as liquidators of useless and insolvent societies. The pay of the inspecting staff commences at Rs. 125 a month and goes up to Rs. 300 per month.

Auditors have similarly been recruited in the past by nomination by the Registrar from among candidates who have passed the university intermediate examination and by the promotion of a certain number of supervisors. They will in future, like the inspectors, be recruited by competitive examination with a reservation of 20 per cent of the vacancies in favour of the supervisors. The intention is to have one auditor for every 100 societies with a view to completing the statutory audit within the year without resort to the employment of central bank supervisors who are officers employed by the co-operative societies themselves. Such resort is obviously incompatible with the aim of having the audit conducted by an outside and independent agency. The expenditure on account of the audit staff is ultimately a charge on the audit fees levied on the co-operative societies, except that the salaries of ten auditors are met from provincial revenues in consideration of the exemption from payment of audit fees granted by Government to societies of less than eighteen months' standing.

Propaganda, organisation and internal discipline are being more and more taken over by the societies themselves and their federations; and departmental activities in these respects are confined to developing special types of societies and to organising credit societies in areas which still remain outside the influence of the co-operative movement.

The credit movement in the province is now regarded as having gained such strength as to advance by its own momentum and it is said to have already effected a marked reduction in the prevailing rates of interest in the districts where it is strongest, such as Mymensingh, Tippera

and Midnapore, and to have taught a large section of the people, who never used their surplus monies themselves, the habit of investment. But in Bengal, as elsewhere, it must be admitted that the co-operative movement is as yet only carrying a tiny fraction of the total finance required annually by the cultivators.

Co-operative credit forms by far the most important feature of the co-operative movement in Bengal, as elsewhere in India. There were, however, at the end of June 1926, 53 agricultural purchase and sale societies, 350 irrigation societies, 74 milk societies, 21 co-operative agricultural associations, and one *ganja* society at Naogaon.

The problems of the successful joint sale of agricultural produce are found everywhere to be far more serious than those attending the organisation of credit, owing, largely, to the difficulty of obtaining skilled business advice at a remuneration which the societies can afford to pay. It is, therefore, particularly interesting to note that several societies for the sale of jute have been started and that the Co-operative Department is making every effort to overcome these difficulties, which are specially marked in the case of a product such as jute where there is a strong speculative element in the trade and great fluctuation of prices. Further particulars regarding these will be found in the section dealing with Communications and Marketing. Paddy sale societies have also been started and to enable them to make the most effective disposal of the members' stock a central godown has been started in Calcutta with the help of a subsidy from Government.

Reference has already been made to the work of the 350 irrigation societies and a description of a further activity not yet mentioned, namely that of the Central Co-operative Anti-malarial Society and its many daughter societies, will be found in the section dealing with Public Health and Sanitation.

Some reference to the work of the Milk Union, Calcutta, and its dependent societies may be of interest in view of the importance of obtaining for Calcutta an adequate and pure milk supply. The operations of each of the 71 milk societies constituting the union is generally confined to one village, the members of which are *bona fide* milk producers whose primary occupation is agriculture with milk production taking a secondary place. The societies are arranged in groups for the purpose of collecting milk by paid milkers and carriers. Each group consists of six or more societies. The milk obtained from the societies in a group is collected at a depôt, which is under the charge of a depôt manager whose duty it is to receive the milk in properly sterilised cans, measure it, note the general condition by lactometer and give a receipt to the carrier. The work of the depôt is looked after by a depôt supervisor who is maintained by the union. The milk when received by the union is distributed by their staff, either salaried or paid on commission, or by traders who purchase their supply outright. The union has established distributing centres at convenient places all over the city. Government assists the movement by lending a veterinary assistant surgeon who examines

and treats the cattle belonging to the societies, supervises the market arrangements and looks after the sanitary condition of the cow sheds. The operations of the union are at present on a very small scale; its sales on the average throughout the year are only about 70 *maunds* of milk as against an estimated daily consumption of 3,000 *maunds* in the city of Calcutta. The experiment is, nevertheless, an important and hopeful one. The financial position of the union is sound. Every year, except in the year of its foundation (1919-20), it has made a profit; the profits have steadily risen and out of a total working capital of Rs. 75,368, only Rs. 15,834 or about 20 per cent has been obtained from outside sources. The way in which the union spends part of its profits is of striking interest. Rs. 800 goes towards the education of sons of the members of the societies by means of assistance given to five primary schools and one secondary school in the area in which the union operates. In addition, it has given a donation of Rs. 600 towards the construction of two primary school buildings. The union has also arranged for the delivery of lantern lectures on sanitation, anti-malarial and anti-*kala-azar* work, and has made provision for treating any of its members who may be suffering from malaria and *kala-azar*. Finally, as a work more strictly relevant to its object, the milk union has distributed fifteen stud bulls to the primary milk societies and has made provision for replacing them when necessary.

The Naogaon Ganja Cultivators' Co-operative Society, Limited, also deserves notice. This is a successful instance of the routing of oppressive middlemen. The cultivators have been given a monopoly of the cultivation of this drug which is sold under license from Government. With a membership of 3,694 it sold over Rs. 9½ lakhs of products; its total management costs were under one lakh of rupees although it has to contribute towards the cost of the excise preventive staff; and it made a profit of over Rs. 2⅓ lakhs, paying a dividend of 12½ per cent on its shares. It maintains a reserve fund of Rs. 2⅕ lakhs. The most interesting thing about the society is, however, the considerable sums which it spends on schemes of public utility in its vicinity. It spent, in 1925-26, Rs. 9,300 on maintaining three medical dispensaries and one veterinary dispensary in addition to defraying the cost of the buildings; Rs. 10,000 towards the cost of primary and secondary schools; Rs. 4,000 on improving communications and also gave a donation of Rs. 5,000 to the Naogaon Agricultural Association. In addition to spending no less than Rs. 28,300 *plus* the cost of buildings in these excellent ways in the course of one year, it also maintains night schools and girls' schools which are reported to be doing very good work.

With the assistance of Sir Rabindra Nath Tagore, six rural reconstruction co-operative societies have recently been started in the Birbhum district. These societies have, as their aim, general social improvement on the widest basis. Their activities include the provision of better seeds and implements, the promotion of cottage industries, the stocking of tanks with fish, as well as the more directly social services of education and sanitation.

11. COMMUNICATIONS AND MARKETING.

Prior to 1850, there were no railways in Bengal. The Eastern Bengal and East Indian railways which are State railways, and the Assam Bengal and Bengal Nagpur railways, which are managed by companies, now serve the province. The East Indian and Bengal Nagpur railways serve the west of the province, the Eastern Bengal Railway serves the north-central and central-eastern areas, while the Assam Bengal traverses the eastern marches of the province. Of these railways, the Eastern Bengal is by far the most important to the province, its milage amounting to one-half of the total provincial railway milage. There are also 237 miles of light railway. The total milage open to traffic in 1926 was 3,281 miles. As in 1921 the open milage was 3,270, railway facilities have not improved during the quinquennium. This stagnation has been due to financial stringency which is now passing away. While no big construction is in contemplation, some 80 miles of new line, in addition to the construction of the Calcutta Chord Railway, mainly an urban interest, were sanctioned in 1925-26 and in the same year the Railway Board approved of surveys being undertaken for another 140 miles of line. The Railway Board are also undertaking for the local Government a traffic survey for the proposed railway linking Dacca with Aricha on the Padma, a distance of about forty miles, on condition that the local Government pay the cost of the survey if its result is to prove the unremunerative character of the line. If built, this line will open up the whole tract of country between the Padma and Dharleswari rivers. Another project, the Faridpur-Bhanga Railway, has had to be dropped for the present as the Railway Board did not succeed in obtaining from the Government of Bengal or the District Board of Faridpur any guarantee against loss.

The total length of metalled roads in the province is estimated to be about 3,410 miles and that of unmetalled roads about 34,273 miles. These figures include 2,496 miles of metalled, and 33,557 miles of unmetalled, roads maintained by district and local funds, but exclude roads maintained by municipalities. Thus, three-fourths of the metalled roads and practically all the unmetalled roads are maintained by district and local authorities. The evidence indicates some apprehension that local authorities are scarcely sufficiently alive to the great responsibility thus laid on them for promoting the economic welfare of the cultivator and of the province generally. The provision of finance is the stumbling block as in the case of so many other measures in Bengal the need for which is generally admitted. The total expenditure on communications during the year 1924-25 was about Rs. 28¼ lakhs out of which about Rs. 90,000 came from the Government of India as a grant towards the upkeep of trunk roads.

In the deltaic region of central and eastern Bengal, roads are to a very large extent replaced by waterways. As these serve the jute districts, the maintenance of navigation through them is of great economic importance and the steamers plying on them take the place of railways as targets of public criticism. The responsibility for such maintenance

lies with the Irrigation Department which maintains a fleet of dredgers. On small waterways, the encroachment of the water hyacinth (*Eichhornia crassipes*) is causing anxiety; in some instances, channels of communication have been choked up entirely, while, in others, the movement of agricultural produce has been appreciably hampered. The Narayanganj Chamber of Commerce brought the danger of the pest to the notice of Government in 1914. No practicable scheme for dealing with this pest has yet been evolved.

It has been decided not to proceed further with the Grand Trunk Canal project. This project, which was estimated to cost about three crores of rupees, was to reduce by 136 miles the distance from Calcutta to the east by offering an alternative waterway to that of the outer steamer route by the Sundarbans. Doubt was, however, expressed by the Bengal Chamber of Commerce and the steamer companies whether the opening of this new waterway would enable the present outer steamer route, which has to be kept open by dredging, to be dispensed with, and Government decided that it was impossible, for financial reasons, to incur expenditure on keeping two routes open.

While there is still abundant opportunity for development, Bengal, if comparison is made with systems of communication in other provinces, is well served by her system of roads, railways and waterways.

Marketing.

The features of Bengal marketing are the number of *hats* or weekly markets, often of a proprietary character, and the number of middlemen between the cultivator and the consumer. Excluding the Chittagong Hill tracts and the Darjeeling district, the number of *hats* returned at the census of 1921 was 6787, and of these 1398 had bazaars which were open every day. Whether there is a daily bazaar or not, each *hat* usually has two market days a week. The average distance between *hat* and *hat* is only four miles and there is a sufficient number of them to provide one for every thousand males of fifteen years and over. But the average attendance is far more numerous than this, which indicates that, as a rule, a cultivator regularly attends more than one *hat*. Many of these *hats* are more occasions for social intercourse than centres of trade. Much of the trade done is small retail trade as these *hats* take the place of the village shop which, in rural Bengal, is conspicuous by its absence.

Of the commercial crops, tea is in quite a special position as a highly organised industry. No middlemen participate in the marketing of tea. In the case of the other commercial crops, the number of middlemen is larger than in the case of ordinary food crops. Their organisation and the length of the chain differ somewhat with each variety of crop. Broadly speaking, however, for the three principal commercial crops, namely, jute, rice and tobacco, the procedure is for primary collectors to go from cultivator to cultivator or to visit the small primary markets, purchasing the crop surplus to the needs of the cultivator and his immediate vicinity. Purchase is usually outright. The primary collectors take their purchases to the big centres of trade. There it is purchased by or on behalf of traders and financiers who may either export it to Calcutta, or, more usually, sell it to a third party who has storage

accommodation, and will wait his time to sell to the exporter. This succession of middlemen is not, of course, invariable—a cultivator in the case of jute, for instance, may deal with the baling firm direct and thus share between them as principals what would otherwise have gone to the middlemen as commission. The amount of that commission varies from crop to crop and is differently computed by different observers but is not, perhaps, far short of 20 to 25 per cent of the current value of the crop 'on the ground', where the normal chain of these middlemen links the producer to the exporter.

The marketing problem in Bengal is, in essentials, the same from the agricultural standpoint as elsewhere in India: it is to obtain for the cultivator a greater share of the price of his produce. One solution is to develop co-operative marketing. In spite of the difficulties at the present stage of the co-operative movement, a start has been made in the case of both jute and paddy. The jute societies in particular merit notice. Five societies are already working, possess godowns and baling machinery of their own, and are regarded by an independent though interested witness as possessing great possibilities provided the up-country administration is good. The Registrar of Co-operative Societies states that the societies have engaged competent managers. They have, moreover, in his opinion, been successful within the short time (about two years) that they have been in existence in establishing so good a reputation in the Calcutta market as to obtain for their bales the same price as for bales packed by European firms. These societies are to act as supply societies to the cultivators during the off season for jute sales.

The operations of the milk union and its constituent societies, which are interesting as a successful instance of highly organised co-operative marketing, have already received mention in the section dealing with Co-operation.

12. LOCAL SELF-GOVERNMENT.

The frame work of local self-government in Bengal is a central directing authority, controlling a net work of local authorities charged with responsibility for local executive action.

The central authority is the Local Self-Government Department of the Government of Bengal, consisting of a Minister for Local Self-Government, a Secretary and a Secretariat. Two separate technical sub-departments are attached to the Local Self-Government Department, one under the Director of Public Health and the other under a Chief Engineer for Public Health. The Public Works, Medical, Education, Veterinary and to some extent, the Agricultural departments also have relations with the local authorities.

The following local authorities at present function in the rural areas of Bengal:—

(*a*) District boards.
(*b*) Local boards.
(*c*) Union boards.
(*d*) Union committees.
(*e*) *Chaukidar panchayats.*

Of these it is not proposed to refer further to local boards,* union committees and *chaukidar panchayats* as the first named have in general very little power and the union committees and *chaukidar panchayats*† are being steadily replaced by union boards.

The district boards function under the Bengal Local Self-Government Act of 1885. There is one board for each of the 27 districts in Bengal and each board is reconstituted once every three years. The number of members varies from 15 to 33. In 23 of the districts, two-thirds of the members are elected and one-third nominated; in one district one-half only are elected and in two districts all the members are nominated. The nominated members are selected by the Divisional Commissioner on the recommendation of the District Magistrate subject to the approval of Government.

The powers of these district boards which more particularly affect rural agricultural questions are as follows. They are instructed under the Act to maintain and manage primary and middle schools, dispensaries and hospitals, roads, bridges and channels of communication and to construct new roads, to provide and improve the supply of drinking water, to provide new drainage and improve existing drainage and generally to arrange for the proper sanitation of the district. District boards may hold fairs and agricultural and veterinary exhibitions, provide veterinary dispensaries for treatment and prevention of cattle diseases, and veterinary training; also may provide for the improvement of cattle breeding. They may make grants in aid of measures for agricultural and veterinary improvement, though they are not enabled to employ a staff for agricultural demonstration work nor can they establish farms of their own. They may also carry out any local work likely to promote the health, comfort and convenience of the public. The average income of each board for the year ending 31st March 1926 amounted to nearly five lakhs of rupees. About three-fifths of the total income of the boards is derived from the road and public works cess. This cess is a local rate levied now at the maximum rate of 6¼ per cent (one anna in the rupee) of the annual value of the land, including mines. The cultivating ryot pays at half an anna per rupee of his rent and the remaining half is payable by the landlords of all grades. Re-valuation of land for the purpose of the cess cannot take place more often than at five year intervals and in practice re-valuations are made at intervals of ten or fifteen years. In the last decade the amount of cess leviable has risen by about 20 per cent from 68 to 82 lakhs.

The remaining two-fifths of the boards' income is derived from government contributions for the Education and Medical services, from an "augmentation grant" by Government of 25 per cent of the total amount of the road cess, and from miscellaneous sources such as income from the Cattle Tresspass Act and from tolls. Under the present

* Local boards, of which there is usually one in each subdivision of a district, occupy a position intermediate between district boards and the local unit of self-government (union boards and committees and *panchayats*).

† Village committees whose primary duty is to maintain a policeman.

system, the boards have no responsibility for the provision of finance as their revenue is collected for them.

In 1925-26, the boards spent about one-half of their income on communications and public works and one-third on education.

The union boards have been brought into existence under the Bengal Village Self-Government Act of 1919. The average area served by a union board is ten to fifteen square miles and it is intended that these boards shall become the primary unit of local administration. At present, eight districts* are entirely covered by union boards ; eleven other districts are partially covered and seven districts are without any boards. In the nineteen districts in which the boards function they number in all 2,443. When the whole presidency is supplied with union boards, they will number about 5,000. The change, therefore, from union committees and *chaukidar panchayats* to union boards is just about half accomplished. Each union board consists of nine members of whom six are usually elected and three are nominated. Elections take place once every three years and every one who pays a cess or a union rate of Re. 1 is entitled both to vote and to be a candidate in these elections. The three members not elected are nominated by the District Magistrate on the recommendation of the circle officer. Each union board elects a president and also a vice-president, if necessary. The president and vice-president are unpaid. The circle officers who recommend nominations and who also conduct the elections are sub-deputy collectors of the Bengal Junior Civil Service. Each circle officer is under the control of the local District Magistrate and each officer's circle comprises 25 to 30 union boards. They audit the union boards' accounts and generally supervise the boards' activities. It has been found that, so far, the efficiency of a union board depends very largely upon the personality of the president and the driving power of the local circle officer.

The powers of the union boards which in particular affect agricultural interests are the provision of sanitation and conservancy (particularly of fairs), the execution of works required for the preservation of public health, including all other works likely to promote the health, comfort and convenience of the public, provision of water supply for public and private purposes, provision and control of public roads, bridges and water ways, provision and control of primary education and dispensaries, and, generally, the performance of duties which may be made over to them, with the necessary finance, by the district boards. Union boards are not empowered to undertake purely agricultural work but there are many schemes of agricultural improvement such as agricultural drainage which could be classed as schemes of communication (waterways) or of sanitary drainage, and such schemes come within the scope of their powers. The responsibilities and opportunities of union boards are, therefore, great. Each board is obliged to raise a sum sufficient to maintain the village police and has also power under the Village Self-Government Act to impose a rate of such an amount as shall meet the

* Bankura, Birbhum, Hooghly, Howrah, Nadia, Faridpur, Bogra and Tippera.

other expenses of the board in carrying out the duties laid upon it. Unfortunately, the rates which the boards have so far seen fit to levy for the latter object do not provide an income which is by any means commensurate with their responsibilities. After deducting the minimum amount necessary to keep up the village police and to pay the rate collector and clerk, if one is required, their income for works of public utility does not exceed on the average Rs. 1,050 a year (including district board grants) and in practice more than two-thirds of this sum is spent on village roads and drainage. The inadequacy of this income for the development of a rural area of ten to fifteen square miles, with an average population of 10,000 people, is patent.

13. PUBLIC HEALTH AND SANITATION.

The menaces to public health in Bengal are well known—malaria, cholera and malnutrition. Cholera is easily controllable, given a good water supply and the most ordinary sanitary precautions, but in the present conditions it reappears year after year and accounts on the average for rather over five per cent of the total mortality. Malaria, unlike cholera, is not a swiftly killing disease, but no disease is more disastrous to the well-being and efficiency of the population. For some three months in every year, the capacity for labour of a large proportion of the inhabitants of rural Bengal, especially of west Bengal, is much impaired by attacks of malaria. The development of irrigation, which is, as we have seen, desirable on other grounds, may do much, by making possible a greater intensity of cultivation, to improve malarious tracts. There can be no doubt, too, that malaria, in lowering the vitality of the mothers, is one of the principal causes of the high rate of infant mortality from which Bengal suffers. *Kala-azar* is another fever which inflicts much loss on the population, though a specific is now known which reduces the rate of mortality from it.

Malaria is much more difficult to control in rural than urban areas, but it is in the Bengal villages that epidemic malaria most frequently breaks out. While it cannot be successfully combated merely by the distribution of quinine, experience has shown that epidemic malaria can be greatly diminished by its use. In Bengal, government quinine is sold to the general public through the agency of about 3,225 post offices, but the total amount sold is very small. In 1913 the Bengal post offices sold 7,636 lbs. of quinine. In 1926, 8,406 lbs. were sold. The sale price per box of tablets has been continuously reduced since 1918 and now stands at Rs. 2-7 or six annas more than the price in 1913. It is noteworthy that more boxes were sold in 1918 (102,000) when the price stood at Rs. 4-6 per box than in 1927 (90,000) when the price was Rs. 2-7.

The following Table showing the number of pounds of quinine sold through the post offices in each of the natural divisions in Bengal during the year 1920 is of interest. For purposes of comparison, Dr. Bentley's

calculations of Italian and Greek consumption of quinine are included in the statement :—

	Quinine sold, 1920	Grains per head of population	Quinine required on Italian scale	Quinine required on Greek scale
	lbs.	Grains	lbs.	lbs.
Western Bengal	1,227	1·11	20,000	80,000
Central Bengal	1,741	1·42	20,000	80,000
Northern Bengal	1,009	0·69	23,000	92,000
Eastern Bengal	4,924	1·99	40,000	160,000

In addition to sale through post offices, quinine and cinchona derivatives are distributed by Government through local authorities, anti-malarial societies and other institutions. The following amounts have been distributed during the past four years :—

	lbs.
1923-24	4,511
1924-25	8,369
1925-26	9,607
1926-27	11,930

It should, however, be added that a considerable, though unknown, amount of quinine, is annually distributed to the poor by charitable dispensaries all over the presidency.

Very little land is available for planting cinchona at the higher elevations required by such species as *Cinchona officinalis* and *Cinchona ledgeriana*, but *Cinchona succirubra* can be grown on relatively low elevations and yields the red bark which, though not so rich in quinine, yet produces a large supply of other cinchona alkaloids. It is proposed to plant 2,000 acres in Samsingh with *Cinchona succirubra* in 1928.

From the existing cinchona plantations in Bengal about 400,000 lbs. of quinine can be obtained or about 25 years' supply if the present scale of demand continues. But it is urgently necessary that consumption of quinine and other preparations of cinchona bark should be greatly increased. The problems of supply and increased use are common to all India and have been dealt with in the Report. It is consequently unnecessary to say more here than that, whatever policy may be adopted, no province stands in more urgent need of expanding its supplies and annual rate of consumption than Bengal.

The third menace—malnutrition—is the most insidious because the least recognised. It is the condition precedent to disease of all kinds attaining epidemic proportions. The importance of diet in relation to health is only just beginning to be recognised, thanks to the research now being conducted in Europe, America and India. It is certain that the knowledge which is now being gained as to the elements which an optimum diet must possess will eventually prove the most efficient of all weapons in the fight against disease and misery. So far, it has proved impracticable to pass a Public Health Act for Bengal owing to

the widespread dislike of giving new powers of taxation which must accompany such legislation, if it is to be fruitful.

The existing public health organisation is both central and local. The central organisation consists of a Sanitary Board of officials and non-officials over which the Secretary to Government in the Local Self-Government Department presides and of a Department of Public Health (including a Publicity Branch) administered by a Director, to which is attached a Sanitary Engineering Branch administered by a Chief Engineer; a special Malaria Officer is maintained at headquarters. There are also public health laboratories in Calcutta and Dacca and a municipal laboratory at Darjeeling. These laboratories have important work to do under the Bengal Food Adulteration Act.

The local organisation in rural areas consists of health officers who hold a diploma in public health, a staff of doctors to cope with epidemics and a number of sanitary inspectors, all in the employ of district boards. Only one district board is now without a health officer. The central Public Health Department also keeps a small staff of sub-assistant surgeons for loan to local authorities in connection with epidemic outbreaks of disease. All that is lacking to set this organisation on a vigorous forward policy is finance.

In the meantime, Government are doing what they can. They already pay half the salary of the health officers employed by district boards and they have now decided to provide boards with funds to enable them to maintain assistant health officers with the necessary staff and equipment for work in the interior of districts. Government also make an annual grant of Rs. 2½ lakhs for the improvement of rural supplies of drinking water. The grant is disbursed, under the orders of the Divisional Commissioner, by district officers, who use it to supplement the funds raised by union boards or by co-operative societies and other voluntary organisations where there are no union boards. The grant thus serves as a stimulus to local effort.

Government also make certain annual payments for a term of years to enable local authorities to carry on prescribed forms of medical or sanitary work, including grants-in-aid to co-operative anti-malarial societies.* The Publicity Officer attached to the Public Health Department also helps in the organisation of these societies and gives lantern lectures at various local exhibitions, etc.

Of the various private efforts to improve public health in Bengal, the anti-malarial societies deserve special notice. Started by Rai Bahadur G. C. Chatterji in 1917, the organisation of the Central Co-operative Anti-Malaria Society, Ltd., included by the end of 1926 some 300 registered societies besides some 700 " live " unregistered societies. From the point of view of stability, there is the serious defect that, so far, it has not proved possible to link up effectively this central society with the numerous village societies. It is also unfortunate that there does not exist, at

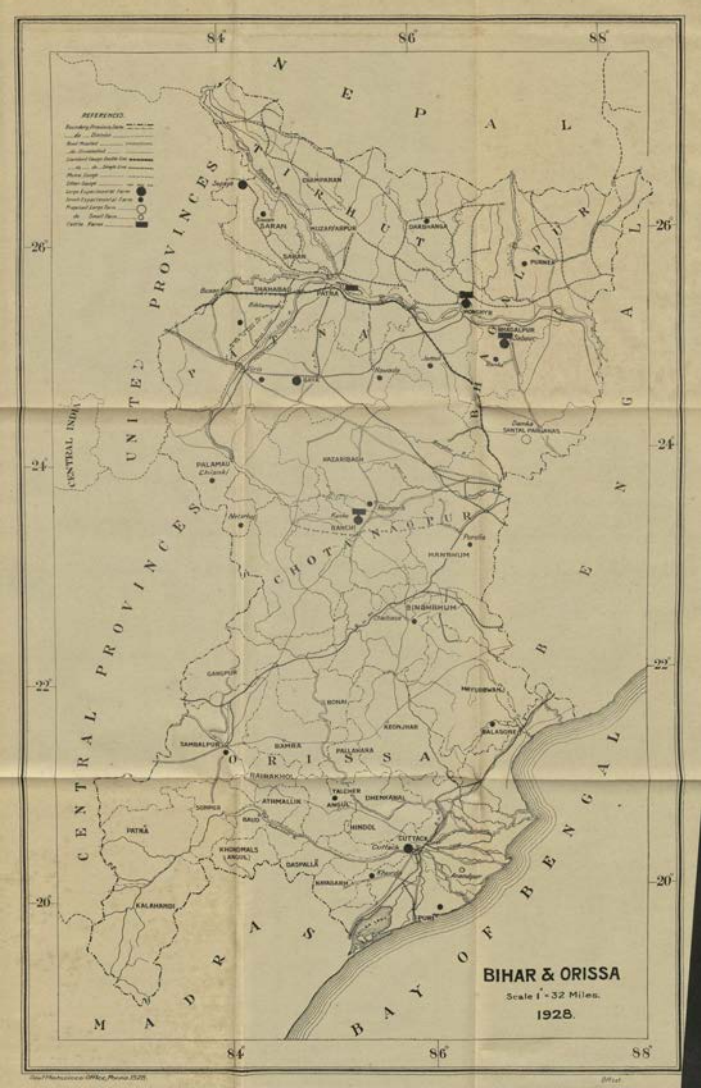
* The Central Co-operative Anti-Malaria Society has received so far about Rs. 70,000 from Government in this way.

the present time, a closer affiliation of the movement with local bodies. The movement (which seeks to combat *kala-azar* and general insanitary conditions in villages as well as malaria) received a warm tribute of praise from the Director of Public Health in the course of his written evidence: " ....there are now many hundred branch co-operative public health societies in Bengal to-day..... In my opinion, a very large proportion of the societies .... have in the main achieved their aim, *viz.*, the awakening of Bengal villagers to the necessity and the possibility of improving the health of their villages by their own efforts." These societies believe in practical work: they undertake to kerosene ditches and tanks, excavate drains and track out malaria " carriers " for remedial treatment. The central society also maintains a cholera brigade.

Another private movement which merits notice, as an effort to reduce the high rate of infantile mortality, is the establishment of " Baby " clinics and welfare centres which has resulted from Bengal's participation in the all-India Baby Week movement; as also the steps taken by many district boards to train *dais* (midwives)—a much needed work which is, as the last Bengal Public Health Report states, admirably suited for private enterprise on the lines of the co-operative anti-malarial societies noticed above. Good work is also being done by the Bengal Social Service League in regard to cholera prevention, in which inoculation is playing an increasingly important part.

As regards medical aid, dispensaries are maintained and aided in rural districts by the district boards which also contribute to the upkeep of hospitals at the headquarters of districts and subdivisions. The hospitals (excluding those in Calcutta) have over 3,000 beds but the nursing arrangements are stated to be unsatisfactory. An average of about 7,000,000 persons a year receive treatment as out-patients at these dispensaries; some 40,000 in-patients annually pass through the mofussil hospitals. The problem of bringing medical aid to rural districts is still in the main unsolved. It is interesting to note that a feature of the Medical Relief Association founded in 1921 for the village of Behala close to Calcutta was a contribution by the people themselves. A development of the principle of voluntary medical insurance upon which this contribution was based might prove of great assistance in solving the problem on its financial side.

A Pasteur Institute in Calcutta provides anti-rabic treatment for Bengal and Bihar and Orissa. Calcutta has also a School of Tropical Medicine and Hygiene, believed to be the first institution of its kind in the East, which conducts a number of enquiries for the Indian Research Fund Association.



BIHAR & ORISSA
Scale 1" = 32 Miles.
1928.
NEPAL
BENGAL
BAY OF BENGAL
MADRAS
CENTRAL PROVINCES
UNITED PROVINCES
CENTRAL INDIA
TIRHUT
PATNA
BHAGALPUR
CHOTANAGPUR
ORISSA
CHAMPARAN
SARAN
MUZAFFARPUR
DARBHANGA
PURNEA
SHAHABAD
PATNA
MONGHYR
BHAGALPUR
SANTAL PARGANAS
PALAMAU
HAZARIBAGH
BANCHI
MANBHUM
BINBHUM
GANGPUR
BONAI
MAYURBHANJ
KEONJHAR
BALASORE
SAMBALPUR
BAMRA
PALLAHARA
RAIRAKHOL
TALCHER
ANGUL
DHENKANAL
ATHMALLIK
SONPUR
BAUD
HINDOL
PATNA
KHONDMALS (ANGUL)
DASPALLA
CUTTACK
KALAHANDI
PURI
84°
86°
88°
26°
24°
22°
20°

BIHAR AND ORISSA

1. GENERAL FEATURES AND NATURAL DIVISIONS.

The Province of Bihar and Orissa, which was formed in 1912 from the Patna, Tirhut, Bhagalpur, Chota Nagpur and Orissa divisions of the Bengal Presidency, has an area of 71,552,000 acres or nearly twice that of England and Wales. This area, according to the census of 1921, carried a population of 37,961,858, and some of the agricultural land in North Bihar carries a greater number of people than any other agricultural area in India. Of this area, however, no less than 18,335,000 acres are occupied by Feudatory States.

The physical conditions of the province are diverse ; within the oblong of some 450 miles from north to south and 250 miles east to west, which is the general shape of the province, a traveller entering from the State of Nepal, which bounds the province to the north, would traverse the rich alluvial plain of Bihar for the first 150 miles, crossing the Ganges about half way. This plain is succeeded by the thinly peopled areas of Chota Nagpur, also about 150 miles in length, which contains rich deposits of coal, iron, mica and copper, the first three of which are extensively worked. This tract of gneissic rocks forming high undulating plateaux fringed by hills, rocks and jungle is very distinctive in appearance from the alluvial areas which lie to the north and south of it. Jamshedpur, where the Tata Iron and Steel Company, as well as other companies, have their works, is the great iron and steel producing centre of India. A third journey of nearly equal length to the first two, through the Feudatory States, where the hills of Chota Nagpur sink towards the Mahanadi delta and the Orissa coast, would bring the traveller to the southern boundary of the province and the Madras Presidency.

There are valuable forests in the Chota Nagpur tract and parts of Orissa are well wooded. *Jhils* or shallow sheets of water are of frequent occurrence throughout the province, and in Orissa there is the extensive, though very shallow, Chilka Lake.

The rainfall increases from north to south ; in Bihar, it averages 50 inches, in Chota Nagpur, 53 and in Orissa, 58 inches. The most regular rainfall is in Chota Nagpur. Severe droughts are experienced from time to time in both the Bihar and Orissa divisions. The famine of 1866 in the latter area was one of the worst famines of which we have record. About ninety per cent of the rain throughout the province falls in the monsoon between June and October, the remaining ten per cent falling as light rain in December, January and February, and in isolated thunderstorms which occur in May. During the monsoon, the littoral districts of Orissa are subject to floods which cause great damage.

The warmest weather occurs in May with a mean temperature ranging between 85° and 94° and a maximum day temperature of 91° to 107°. In some districts, the temperature rises as high as 115°. There is a decided period of cold weather throughout the province, with day temperatures in December and January nowhere exceeding 71° and

falling at night in Bihar and Chota Nagpur to about 51° and in Orissa to 57°. The cold weather in Orissa is very short and less marked than elsewhere. Frost occurs occasionally in the Chota Nagpur plateau of sufficient severity to do considerable damage to plantations of *sal*, etc., but is rare elsewhere in the province.

In regard to the character of the soil, the province has two well defined types: the alluvial tracts, covering practically the whole of Bihar and the coast fringe of Orissa, and the gneissic tracts. Laterite soils are also met with in patches sloping upwards from the alluvium of Orissa towards the interior of the province and forming patches overlying the general gneissic soils of the Chota Nagpur plateau. Except in the Mahanadi delta and the great river beds, practically all the alluvium is of the older type which, generally speaking, consists of alternating beds of sand and clay and, north of the Ganges, frequently contains large quantities of *kankar*, that is, nodules of carbonate of lime. From the agricultural point of view, the chief interest is the extraordinary range of differences in the surface quality of this older alluvium due partly to differences in level but partly also to general differences in chemical and physical composition. In the district of Tirhut, in which the Pusa Research Station is situated, the texture of the soil and its retentiveness of moisture is, so far as is known, unique. The general characteristic of the new alluvium is that it is richer than the older alluvia in plant food, particularly in nitrogen. Most crops do well on the alluvial soils; rice is grown extensively whenever the supply of water is adequate and, where it is not, fruits and vegetables are extensively grown with the assistance of well irrigation; sugarcane does well on the alluvium when the surface is either clay or loam; tobacco and maize are crops especially suited for the lighter loam; and members of the gourd family are extensively grown along the sandy beds of the rivers.

In the gneissic area of the Chota Nagpur plateau with its extension into southern Bihar, the soil has been formed *in situ* from the break down of the crystalline rock composed of quartz, felspar and mica. Terracing has resulted in the formation of much valuable rice land and, in the depressions between the ridges, a good deal of rice is grown. Other crops are maize, millets, oil-seeds and pulses.

The laterite soils, varying from a conglomerate mass of haematite nodules and coarse quartz sand to loose gravel and sandy clay, are agriculturally of no importance.

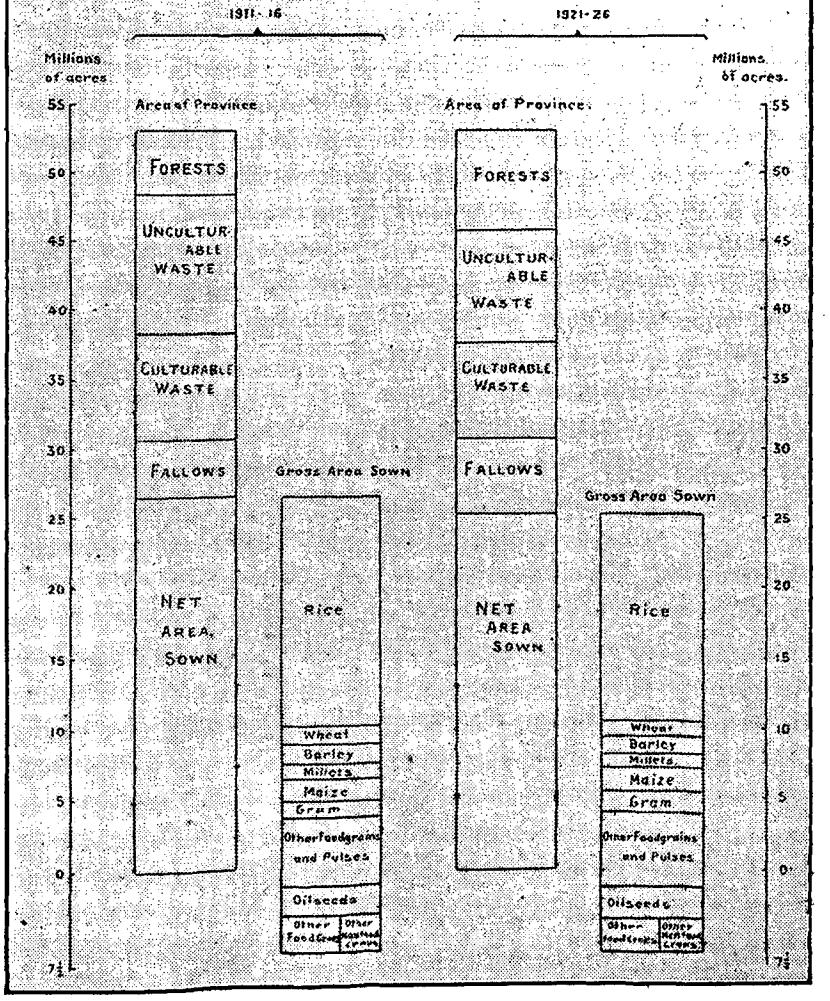
The importance of rice as a crop has already been referred to and the place which it takes among the other principal crops of the province is shown by the accompanying diagram; it is grown throughout the province. Of the cereals, maize, barley, wheat and *marua* (*Eleusine coracana*) are next in importance to rice in regard to the area which they occupy (which is, however, only some 5,000,000 acres as compared with about 14,000,000 acres under rice). The maize, barley and wheat are grown chiefly in Bihar and in the low hills in the south and east. *Marua* is also grown in Bihar but its especial area is the Chota Nagpur plateau where it is the next most important crop to rice. The pulses and other

BIHAR AND ORISSA

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 YEARS AVERAGES)

Note:- The difference between the Gross Area Sown and the Net Area Sown represents the area sown more than once.



To face page 78

food grains occupy about 7,000,000 acres. Oil-seeds are also important not only as a crop, but because half of the harvest keeps 35 oil mills going in the province throughout the year. The balance is exported. The total area under oil-seeds (excluding niger) is about 2,000,000 acres, of which linseed occupies forty per cent. Although sugarcane, jute and tobacco occupy only about 700,000 acres they are, with fruits and vegetables which are cultivated on some 600,000 acres, extremely important in the agricultural economy; condiments, chillies, turmeric and ginger are also grown in Bihar and, in the case of chillies, a valuable export trade is done. The oil-seeds, sugarcane, tobacco, jute (practically confined to the Purnea district) and fruits and vegetables are all grown, chiefly in Bihar and very largely in North Bihar. The major part of the cereals, even of rice, is similarly grown in Bihar. The overwhelming importance of Bihar in the agriculture of the province will thus be evident. Coconuts and cashewnuts are important local crops in Orissa.

A periodical census of livestock is taken. The last census was taken in 1925 and did not, except in regard to sheep and goats which are dealt with separately, show any appreciable increase over the census taken in 1920. The figures, excluding sheep and goats, were: 1920, 20·0 millions; 1925, 20·9 millions. In the last census, there were 6·9 million bulls and bullocks, 5·7 million cows, 2·4 million buffaloes and 5·7 million young stock, including young buffaloes. There is particular difficulty in securing accuracy in a cattle census in Bihar and Orissa owing to the continual movement of cattle down into Bengal for sale and across the borders into Nepal for grazing, but at any rate the figures of the last two censuses should be strictly comparable as they were both taken at the same time of year (January).

In 1913, the number of sheep and goats was estimated at 6½ millions; in 1920, the number had fallen to a little over 4 millions owing to the high prices obtainable during the war for meat and hides, and also to the scarcity prevailing in 1919 in the breeding areas; by 1925, these losses had been rather more than made good and sheep and goats were returned at 7 millions. Goats are bred throughout Bihar and there is a constant demand for them from the Calcutta market. Sheep breeding is carried on mainly in Bihar towards the United Provinces side. Sheep are also kept in Chota Nagpur.

2. PROVINCIAL INCOME AND EXPENDITURE.

The permanent settlement of land revenue in 1793, if it is not quite so dominating a feature in the income derived from land revenue as is the case in Bengal, is yet the most important factor in the provincial finances. The incidence per head of land revenue assessment is the lowest of any province in India, lower even than in Bengal. Owing to the fact that the greater part of the Orissa division is temporarily settled, some power of expansion exists as the following figures indicate:—

	1901-02	1911-12	1926-27
	Rs. (lakhs)	Rs. (lakhs)	Rs. (lakhs)
Land Revenue.. ..	143	157	169

But the growing needs of the province obviously cannot be met from this source. Excise revenue shows a marked elasticity, having risen from Rs. 124 lakhs in 1921-22 to Rs. 197 lakhs in 1926-27 and the revenue derived from stamps also shows a satisfatory increase in the same period. Still, the revenue of the province compares very poorly with that of a province like Bombay, which raises three times as much revenue from a population about two-thirds that of Bihar and Orissa. Of any new expenditure permitted by these somewhat meagre resources, the transferred side of Government, which includes the nation building departments of Agriculture, Education, and the Medical and Public Health services, takes an overwhelming proportion. Indeed, in the three years ending 1926-27, the proportion averaged ninety-three per cent.

REVENUE AND EXPENDITURE CHARGED TO REVENUE

GOVERNMENT OF

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue	164	165	166	168	167	169
Excise	124	154	183	176	197	197
Stamps	87	95	96	100	108	107
Forests	9	9	10	11	10	8½
Other heads	19	16	17	16	17	19½
Irrigation	18	17	18	18	23	24
Debt—Interest	3	3	4	5	7	9½
Civil Administration—						
Administration of Justice ..	3	4	4	5	5	5
Jails and Convict Settlements..	5	6	6	5	5	5
Police	1	3	2	2	2	1½
Education	4	4	5	6	6	6
Medical	1	1	3	5	8	5
Public Health	..	..	..	1	..	..
Agriculture (including Veterinary and Co-operation) ..	1	1	1	2	2	2
Other heads	..	1	1	1	1	1
Civil Works	7	6	6	8	7	6½
Miscellaneous	7	9	7	6	14	7
Miscellaneous adjustments between Central and Provincial Governments	..	..	..	1	..	½
Total, Revenue Receipts ..	453	494	529	536	579	574

BIHAR AND ORISSA

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue	15	16	19	21	21	21½
Forests	10	7	8	8	7	9
Other heads	18	17	17½	19	32	29½
Capital outlay on Forests charged to Revenue	..	..	..	..	1	1
Irrigation—Revenue account ..	24	23	24	26	26	28
Irrigation—Capital Account charged to Revenue ..	1	1	½	..	..	..
Debt Services—Interest ..	2½	2	3	3½	3½	2½
Civil Administration—						
General Administration ..	69	72	71	69	70	72
Administration of Justice ..	35½	35	35	36½	38	40
Jails and Convict Settlements ..	14½	18	16	17	17	18
Police	81	80	79	81	82	82½
Education	54	54	62	68	77	94
Medical	17	16	19	26	28	34
Public Health	3	5	8	9	13	14
Agriculture (including Veterinary and Co-operation) ..	9	9	9	11	11	14
Industries	3	5	6	7	9	8
Other departments ..	2	1	3	1	½	1
Civil Works	61	59	65	67	74	89
Miscellaneous ..	38½	43	40	43	45	47
Provincial contribution ..	10	..	..	..	..	..
Miscellaneous adjustments between Central and Provincial Governments	..	..	..	..	..	
Total, Expenditure charged to Revenue ..	468	463	485	513	555	605

GOVERNMENT OF

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Receipts						
Revenue Surplus	..	31	44	23	24	..
Famine Insurance Fund ..	12	14	12	16	19	16
Appropriation for Reduction or Avoidance of Debt ..	..	..	..	..	..	..
Suspense	..	4	4	5	1	..
Loans and Advances by Provincial Governments	17	16	7	8	10	5½
Loans between Central and Provincial Governments ..	..	20	7	5	..	..
Advances from Provincial Loans Fund	..	..	..	..	..	..
Total, Capital Receipts ..	29	85	74	57	54	21½
Opening Balance ..	100	93	143	176	202	224½
Total ..	129	178	217	233	256	246

BIHAR AND ORISSA

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Expenditure						
Revenue Deficit	15	..	..	..	..	31
Payment of commuted value of Pensions	..	..	..	..	..	2½
Construction of Irrigation Works ..	..	..	—½	..	..	..
Civil Works not charged to Revenue.	..	..	..	..	..	..
Other Works not charged to Revenue	..	..	..	..	..	..
Famine Insurance Fund ..	3	..	1	8	3	7
Appropriation for Reduction or Avoidance of Debt	..	..	..	..	..	..
Suspense	..	4	4½	5	..	1
Loans and Advances by Provincial Governments	13	26	31½	13	3	4½
Loans between Central and Provincial Governments.. ..	5	5	5	5	..	..
Provincial Loans Fund ..	..	..	..	..	25½	7
Total, Capital Expenditure ..	36	35	41	31	31½	53
Closing Balance ..	93	143	176	202	224½	193
Total ..	129	178	217	233	256	246

3. REVENUE ADMINISTRATION AND LAND RECORDS.

For purposes of revenue administration, the province is divided into five divisions, Patna, Tirhut, Bhagalpur, Chota Nagpur and Orissa, with a Commissioner at the head of each, and 21 districts in charge of a Magistrate and Collector or Deputy Commissioner. The unit of revenue administration is the district, and revenue questions which cannot be settled finally by the officer in charge of the district go up (except in respect of Excise and Salt for which there is a special Commissioner) to the Divisional Commissioner and from him, if necessary, to the Board of Revenue, which consists of one member. The Board not only deals with revenue questions, but has, *inter alia*, the very important duty of managing estates under the Court of Wards Act.

For the Orissa Feudatory States there is a special administrative officer designated the Political Agent and Commissioner, who has special revenue and judicial powers.

The main sources of provincial revenue in Bihar and Orissa are land revenue, excise and stamps. The main source of revenue for local self-government is a local cess on the land and on profits from mines, forests, etc.; this is not included in the Table of Provincial Income and Expenditure.

For the present purpose, only land revenue will be referred to. The marked feature in the land revenue system of Bihar and Orissa is the fact that the revenue is fixed in the divisions of Patna, Tirhut, Bhagalpur and Chota Nagpur under the permanent settlement concluded by Lord Cornwallis in 1793. The incidence of land revenue per head of population (7⅓ annas) is lower than that of any other province in India—Bengal being next with 10⅙ annas.

In the permanently settled area of Bihar and Orissa, the feature from an agricultural point of view is the absence of a subordinate revenue staff such as is maintained in temporarily settled areas. The consequence is that much less is known about the state of cultivation and the condition of crops, as reliance has to be placed on district officers and their subordinates who are relatively few in number and, moreover, do not need to obtain such information for the performance of their ordinary duties.

The conditions of this permanent settlement (which confirmed a "decennial" settlement completed in 1791—the first comprehensive settlement undertaken after the succession of the East India Company in 1765 to the Dewani of Bengal, Bihar and Orissa*) were embodied in a proclamation issued on 22nd March, and now known as Regulation I of 1793. It declared that the zamindars, independent talukdars, and other actual proprietors of land with whom the "decennial" settlement had been concluded would be allowed to hold their estates at the same assessment for ever but that "no claims for remission or suspension of rent were to be admitted on any account and lands of proprietors were to be invariably sold for arrears." Proprietors were also declared to have the privilege of transferring their lands without the sanction of Government and partition of estates was freely allowed.

*At that time "Orissa" comprised only a small tract of country now included in the Midnapore district of Bengal.

There has been a long history of attempts on the part of Government to regulate equitably the relations between the zamindars and their tenants. The intention at the time of the permanent settlement was to confer an immunity on the ryots against the enhancement of their rents similar to that which had been granted to the zamindars in respect of their assessment. But this intention was soon lost sight of and, on the contrary, with a view to assisting the zamindars to pay their own fixed land revenue to Government, certain powers over the person and crops of a defaulting ryot were given to them in 1799. In 1859, legislation was passed with the object of giving the ryot some measure of protection; this failed, however, of its purpose and the relations between the zamindar and his tenant in the divisions of Patna, Tirhut and Bhagalpur are now regulated by the Bengal Tenancy Act of 1885. The objects of this Act are: (1) to give the settled ryot the same security in his holding as he enjoyed under the old customary law, (2) to ensure to the landlord a fair share of the increased value of the soil and (3) to lay down rules by which all disputed questions between landlord and tenant can be reduced to simple issues and decided upon equitable principles. Of the various amendments of the Act, the most important are those effected by Act III of 1898 in regard to the preparation of the record of rights and the enhancement and reduction of rent, and by Act I of 1907, which conferred greater authority on the record of rights when duly prepared and published, but the principles of the Act of 1885 remain unaltered and, with the amending legislation, it provides a code governing the most important relations between landlord and tenant. It is in force in ten districts of Bihar. The three districts of Angul, Sambalpur and the Santal Parganas have special Tenancy Acts, as have also Chota Nagpur and the three coastal districts of Orissa. All these Acts provide for a record of rights.

It would be impossible and unprofitable within the limits of the present introduction to enumerate the tenures and sub-tenures intervening between the zamindar and the cultivating ryot which are regulated by this legislation. Suffice it to say that while the majority of the bigger estates remain in the possession of the old zamindari families, the landlords have freely used their powers of alienation not only to create subordinate tenures but also to transfer their estates, and that a considerable part of the area which was permanently settled in 1793 is no longer in the direct possession of the descendants of the original owners.

The temporarily settled tracts consist chiefly of territories acquired subsequent to the permanent settlement. Much the most important of them is the tract which constitutes the Orissa division but there are a number of estates held direct by Government in other divisions, of which the Khurda, Palamau, Banki and Angul estates are the principal ones. In 1925-26, 329 estates out of 118,907 were held direct by Government* and contributed thirteen per cent of the total land revenue.

* These estates directly held by Government constitute only a small fraction of the total number of estates subject to periodical settlement. In Orissa alone, the number of such estates runs into several thousands and there are several hundreds scattered about the permanently settled tracts of Bihar.

Purchases at revenue sales have gradually extended the temporarily settled areas.

The Orissa Tenancy Act of 1913 replaced for the three districts of Cuttack, Puri and Balasore, the Bengal Tenancy Act which had previously been in force. The object of the Act was identical with that of the Act it superseded, *viz.*, to regulate the relations between landlord and tenant.

Chota Nagpur also has a special Tenancy Act of its own (Act VI of 1908 and subsequent amendments). This Act not merely superseded the previous Acts in force in Chota Nagpur but introduced a number of principles adopted from the Bengal Tenancy Act and set the substantive law regarding the customary rights and usages of the aboriginal ryots on a firm basis. It has been successful in allaying the discontent which, as recently as 1900, manifested itself in an armed rising and has protected the rights of the aboriginal population where these have been endangered by the passage of the estates of indigenous landholders into the hands of ryots, often of the moneylender class.

There is another Act peculiar to this part of the province (The Chota Nagpur Encumbered Estates Act VI of 1876 and subsequent amendments) which was enacted to protect the ancestral estates of the aboriginal landlords who have fallen into debt and to prevent them from being put up to sale.

Land Records and Survey.

A primary object of the framers of the permanent settlement of 1793 was to record all rights in land, but, up to the passing of the Land Registration Act in 1876, the law as to registration was not strictly enforced. The object of the Act of 1876 was not to make an inquisition into titles, but to identify all individuals on whom might be imposed certain duties and obligations in virtue of their being in possession of land as proprietors. Consequently, every person in possession of land, whether revenue-paying or revenue-free, is required to register full particulars. But such registration does not deal with subordinate rights and interests. For several years after the permanent settlement, endeavours were made to maintain a record of these through subordinate officials but without success. At length, however, a procedure was devised under the Bengal Tenancy Act of 1885 for obtaining in a complete form a record of rights of all interests in the land. 1925-26 marked the completion of the record of rights for the whole of Bihar and Orissa, except for a few small isolated areas. The Administration Report of the province for that year observes that " It is difficult to exaggerate the benefit which these operations have brought to landlord and tenant alike, to say nothing of the general public and the administration of the province....District officers report, year by year, that the record is freely used...." The continued value of such a record is dependent on its being kept up to date by successive revisional operations.

4. THE CULTIVATOR.

Bihar and Orissa supports a population slightly larger than the population of England and Wales on an area nearly twice as large.

The total population of Bihar and Orissa, including the Feudatory States, as recorded at the census of 1921, was about 38 millions, of whom some four per cent only lived in towns. At this census, 81 centres of population were classified as towns, but six of these contained a population of under 5,000 and of the remainder no less than 35 have a population of between 5,000 and 10,000 only. The proportion of the urban to the rural population has remained practically stationary since 1891.

How predominantly rural Bihar and Orissa is, notwithstanding the existence of the industrial areas in Dhanbad and Singhbhum, is well illustrated by comparing the percentage of the urban population (3·7) with corresponding percentages for the neighbouring provinces. In the Central Provinces, the percentage is 9·0, in the United Provinces 10·6 and in Madras 12·4. There are, in fact, only six centres in Bihar and Orissa with a population of over 50,000, *viz.*, Patna, Gaya, Bhagalpur, Jamshedpur, Darbhanga and Cuttack.

The total population in 1921 showed a slight decrease over the total returned in the census of 1911, which is accounted for mainly by the terrible visitation of influenza in 1918 which was aggravated by severe scarcity.

The population presses heavily on the land in North Bihar, where the mean density rises as high as 907, 872 and 870 per square mile in the Muzaffarpur, Saran and Darbhanga districts, respectively. In the Patna district of South Bihar and the Cuttack district of Orissa also, the population is very dense, 763 and 565 per square mile. On the other hand, the Chota Nagpur plateau is thinly peopled, the mean density being 221 per square mile, and, in the Angul district, there are only 109 persons to the square mile. These figures are for British territory only. The sparsity of the population in the Chota Nagpur division brings Bihar and Orissa as a whole down to the third place among the provinces, below Bengal and the United Provinces.

The rural population of the province lives in 104,239 villages and not in isolated houses on their holdings. The villages vary considerably in population. In Bihar, for example, where, as has been mentioned, the concentration of population is greater than anywhere else in India, 14,160 villages in the Tirhut division accommodate 9,688,892 people or an average population of 680 for a village, whereas in Chota Nagpur the average population of a village falls to 280. Village administration varies in the different parts of the province. In the permanently settled tracts of Bihar, there is no village organisation, the real unit being the family, and the landlord and his agent take little interest in the general welfare of the village. In the aboriginal villages of the Chota Nagpur plateau, in the Santal Parganas and in the government estates in Orissa, on the other hand, the village headman is an official of real authority in the village, and manages all its relations with the outside world. In the Santal Parganas, this office is usually, but not necessarily, hereditary. But whatever the organisation of the village may be, it is generally true to say that there is usually no sanitation. Information regarding the health of the population will be found in the last section of this

introduction under Public Health and Sanitation, and information in regard to village roads under Communications and Marketing.

Holdings are small, but exhibit a good deal of variation in gross area. Thus, in the two most thickly populated districts of North Bihar, where the population is nearly 900 to the square mile, the average amount of cultivable land per household is estimated to be 5 acres, whereas in Chota Nagpur the average rises to $11\frac{3}{4}$ acres and, in Orissa, is 9 acres. If, however, account is taken of the fact that double cropping is the rule rather than the exception in North Bihar, that in Chota Nagpur a large, and in Orissa a smaller but still substantial, proportion of the holding is not sown every year, the net or effective holding throughout Bihar and Orissa is uniform at something between six and seven acres. Fragmentation of these holdings is almost universal. It is worst in the Patna, Saran and Darbhanga districts of Bihar and in Orissa, where the average size of the 'fragments' into which the holdings are divided is no more than two-fifths of an acre and it will commonly take a cultivator an hour merely to go the round of all the fragments which comprise his holding. The waste of time and labour which is the most obvious evil of fragmentation is mitigated by the very general practice of combination among neighbouring cultivators to grow their crops in comparatively large blocks on a basis of payment in shares of the produce.

The actual cultivators of the land were estimated in the census of 1921 to number nearly ten millions and, of these, about one million were returned as having subsidiary occupations not obviously agricultural. These occupations include peddling, coal, iron and mica mining, weaving, smithy-work, carpentry and pottery, leather work, fishing and employment as general labourers.

The cultivation in the province varies greatly with the different races, climates and soils of the districts. The best cultivators are to be found in the Saran district of Bihar where the climate is good and the people intelligent, hardy and energetic. Pre-eminent among these are the *koeris* (vegetable gardeners).

The cultivation in Chota Nagpur is, throughout, very inferior to that in Bihar, although there are marked differences within the division itself. But the soil is generally too poor, the population too sparse and the attraction to the industrial centres in the division too great to make practicable even an approximation to the close and careful cultivation which prevails in North Bihar.

The cultivation in the Orissa division falls into two well marked areas. In the west, in the Sambalpur district, conditions are similar to those in the Central Provinces. The cultivators are fairly prosperous, but the standard of cultivation does not reach so high a level as in Bihar, though it is greatly superior to the average cultivation in Chota Nagpur. In the east of the Orissa division, that is, in Orissa proper, the soil in the inland tracts is rich, the climate favourable and the cultivator intelligent. Excellent crops of rice are accordingly obtained in many parts of the district, and the evidence of good cultivation is seen in the ability of this part of the

province to sustain a large population; in the district of Cuttack, the population reaches a density of 565 to the square mile.

This brief description takes no account of certain parts of the province where special conditions prevail, such as the Santal Parganas and the district round Ranchi where there are a fair number of aboriginals. The cultivation in these special districts varies considerably. In some parts, it is extremely good and, in others, it is little more than occasional cultivation of the jungle type.

Below the peasant cultivators come the landless labourers who number some $2\frac{3}{4}$ millions apart from their dependants. Wages are still moderate, though they have risen very considerably since the war, and the landless labourer is in consequence better off and more independent than he used to be.

In the reports on the last settlements of the Hazaribagh and Palamau districts of Chota Nagpur, unfavourable comment is made on the tendency for these landless labourers to become permanently attached to a master. In return for a loan received, such men bind themselves to perform whatever menial services may be required of them in lieu of paying interest on the loan and in consequence lose their status as free labourers.

Seasonal migration is a striking feature in North Bihar. It begins in November and is at its height after the winter rice crop has been reaped in December; the return begins about March-April. The migrants are often accompanied by their families. Crop cutting in northern Bengal is a special attraction for the family party, as the labour of the women and children is a useful asset. But trade, domestic and factory service, and day labouring and carting absorb many into Calcutta. Many others scatter all over Bengal, often plying the business proper to their caste, as cobblers, boatmen, earthworkers, etc. Most of the coolies at the bigger railway stations of western Bengal come from Bihar and Orissa. South Bihar shares in this periodic migration as does also Orissa, migrants from these two areas going mostly to Calcutta. Chota Nagpur also sends large numbers to the coal fields and to the tea gardens in the Duars for periods of from two to six months.

Emigration of a more permanent nature takes place from all three divisions of the province—Bihar, Chota Nagpur and Orissa—largely to the tea gardens in the Duars and in Assam. Emigration from Chota Nagpur to Assam is specially marked, but it is not as a rule permanent, men and their families going for periods of from two to five years.

In the census of 1921, nearly 2,000,000 were enumerated in other parts of India as having been born in the province or equivalent to five per cent of the population of Bihar and Orissa. The census is taken at a time of year (March) when the seasonal migrants are just beginning to return. The census returns do not distinguish between seasonal migration and the longer periods of emigration. As compared with the census of 1911, emigration (which includes seasonal migration) in 1921 showed a decline in both North and South Bihar, but a very great increase in the case of Orissa which was doubtless a reflexion of the

scarcity which occurred in the Puri district in 1920. Emigration from the Chota Nagpur plateau had also greatly increased for similar reasons.

The factors which most affect the well-being of the rural population of Bihar and Orissa are, however, after all neither migration nor access to industrial employment. Those employed in the iron and steel trade, in the 35 oil mills, the 22 tobacco factories and the 15 large sugar mills which the province maintains and the workers in the lac industry are an insignificant fraction of the total population. Agriculture remains the sole means of livelihood for the greater part of the inhabitants of the province.

Factors of real importance to the cultivator are the sources from which he obtains the finance indispensable for carrying out his cultivation, and his ability intelligently to use that finance. At present, these sources of finance are the *mahajan* and the co-operative credit society. Government also provide facilities for borrowing under the Land Improvement Loans Act of 1883, but little use is made of these facilities. No estimate of the finance annually required to carry on cultivation in the province has, as yet, been made, but it is certain that it must amount to many crores of rupees. It is, therefore, equally clear that land improvement loans which amount on an average to Rs. 40,000 a year and loans from co-operative sources, which in 1926 amounted to Rs. 66 lakhs, do not, between them, make any effective impression on the *mahajan's* monopoly.

If the spread of primary education is the essential preliminary to the wide extension of a sound co-operative credit system, as it is now in fact universally admitted to be, it is certain that education and a sound system of financing the growing and the harvesting of crops are both essential preliminaries to the improvement of marketing on any large scale. Unfortunately, there is still almost everything to do in spreading a knowledge of reading, writing and simple arithmetic among the people. In the census of 1921, only 12·6 of the men and 0·7 per cent of the women of twenty years of age and over were returned as literate and, although literacy had increased to some extent since the census of 1911*, the rate of increase clearly allows no hope whatever of any early general attainment of literacy. The position in regard to literacy is further dealt with in the section on Education below.

5. THE AGRICULTURAL DEPARTMENT.

Since the closing of the Agricultural College at Sabour in 1923, there has been no educational centre in Bihar and Orissa at which the research and experimental work of the Agricultural Department could be prosecuted. The Director of Agriculture has his headquarters at Sabour where one of the five central experimental farms of the province is situated. Here also the botanical and chemical work of the department is carried out under the supervision of the Director and the agricultural engineer is stationed.

*Literate	1911		1921	
(aged 20 and over)	Males	Females	Males	Females
	11·4	0·4	12·6	0·7

The general agricultural policy in the province since 1923 has been one of decentralisation and, for administrative purposes, the province is divided into four ranges, North Bihar, South Bihar, Chota Nagpur and Orissa, each under a deputy director. North Bihar and South Bihar have, however, been found to be too big for a single deputy director's charge and the eastern sections of each of these two ranges have, therefore, been placed under an assistant director responsible to the Director. It is contemplated ultimately to have seven ranges and the administrative approval of Government has already been obtained to the establishment of a fifth range for the Santal Parganas in south-east Bihar.

These arrangements are the outcome of the report of an agricultural committee in 1922 which was chiefly composed of members of the Legislative Council and included the Agricultural Adviser to the Government of India. The committee was convened in consequence of the attitude of the legislature towards a scheme for reorganising the department which included the retention of the Agricultural College at Sabour, the development of farms and the establishment of a sugarcane station in North Bihar.

The organisation within each range is based on a central experimental farm. These farms are at Sepaya (379 acres) for North Bihar, Sabour (190 acres) and Gaya (193 acres) for South Bihar, Ranchi (340 acres) for Chota Nagpur and Cuttack (150 acres) for Orissa. Of these, the Cuttack farm, which was started in 1904, is the oldest ; the farm at Sabour dates from 1906, the Sepaya and Ranchi farms from 1913-14 and the Gaya farm from 1924. The ranges are necessarily of very considerable extent. The Chota Nagpur range is, for example, 200 miles from north to south and east to west, and if the other ranges are less extensive, the population is far greater. An organisation confined to one farm could not, in such circumstances, distribute in an effective manner the results of its research work among the cultivators and the agricultural committee of 1922 accordingly recommended the establishment of a small farm in each of the sixty-four subdivisions as a centre for disseminating improvements in that area. Eight such farms already existed at the date of the committee's report, *viz.* : Jamui and Nawadah in South Bihar; Purulia, Ramgarh and Netarhat in Chota Nagpur; and Sambalpur, Balasore and Khurda in Orissa. Since that date, seven more subdivisional farms have been started : Sewan and Darbhanga in North Bihar ; Bikramganj and Siris in South Bihar ; Chaibasa in Chota Nagpur ; and Anandpur and Angul in Orissa. With fifteen subdivisional farms started and three more under construction out of a programme for sixty-four, there is clearly much to be done. The proposed provision for five more farms had to be omitted from the budget of 1927-28 owing to lack of funds. The farms vary in size but, with the exception of Netarhat and Nawadah, all of them are under 50 acres. The area of the Netarhat farm is 193 acres and that of Nawadah 67 acres.

While the organisation of the department is thus based on these farms, the methods of work adopted in the different ranges are not quite uniform. In Bihar, where farms are still very few and the cultivation very close, experiments are made on cultivators' fields and there is widespread

propaganda, in which the co-operative movement takes its share, based on the results. In Orissa, the five subdivisional farms provide a surer basis for demonstration on a similar scale and by similar means. In Chota Nagpur, where the area is large, there has been as yet very little propaganda and the subdivisional farms are only four in number; a start has, however, now been made with propaganda in this area.

The staff of the department consists of officers of the Imperial Agricultural Service, recruitment for which has now ceased, officers of the Provincial Agricultural Service and the Subordinate Service. There are five Imperial Agricultural Service officers, the Director and four deputy directors in charge of the four ranges, and an agricultural engineer recruited on a temporary agreement. There are ten Provincial Service officers; of these, six are assistant directors, two of whom are in independent charge of the east-south and east-north Bihar ranges under the Director of Agriculture and four work as assistants to the deputy directors. Of the remaining four provincial officers, two are agricultural chemists, one is an assistant professor of mycology officiating as economic botanist and the fourth is superintendent of the Monghyr dairy farm. The Subordinate Service is divided into three grades, a small upper grade on Rs. 150—10—200, with two posts on Rs. 225 and one on Rs. 250, consisting of managers of the central farms and probationers for the Provincial Service, a middle grade on Rs. 60—5—150 and a lower grade on Rs. 30—2—60—4—100. Recruits who have passed the intermediate university standard start on Rs. 45 and ordinary matriculates start on Rs. 35. Staff is undoubtedly the greatest difficulty at present in the way of developing the activities of the Agricultural Department. There is now no agricultural chemist or economic botanist belonging to the Imperial Agricultural Service. The work of the agricultural chemist is now being done by the former assistant professor of chemistry and that of the economic botanist by the former assistant professor of mycology at the Sabour College. Both these officers work under the supervision of the Director. All entomological and mycological problems have to be referred to Pusa. The Government of Bihar and Orissa propose to make provision for an agricultural chemist and an economic botanist in the new Superior Provincial Service which is to replace the Imperial Agricultural Service, but it is intended to continue to rely on Pusa in the sphere of entomology and mycology. As regards provincial staff, the intention at present is to recruit men who have taken degrees with honours in science from the universities and to give them a practical agricultural training at the central farms at Sabour, Cuttack, Ranchi and Sepaya under the deputy directors. A graduate who took honours in science at the University of Patna was recruited in this way in 1924. The subordinate staff is trained on the agricultural farms, mainly at the four central farms, but training in agriculture is necessarily slow, and the work at the central and existing subdivisional farms is being carried on under serious disabilities, so much so that the Director in his report for 1925-26 stated that it had become "necessary to check the expansion of the work outside the central and existing subdivisional farms in order to give more

attention to the training of the subordinate staff on these farms and to the work in progress on them."

The work done on crops by the Agricultural Department for the cultivator may best be shown by a brief summary of the principal activities of the four central farms:

Sabour.—Here the crops under study are chiefly sugarcane, potatoes and vegetables. The farm is run by recruits on probation. The installation of two tube-wells in addition to percolation wells enables the greater part of the farm to be irrigated.

Cuttack.—Although the work of the department has been longer established here than elsewhere in the province, the only considerable success so far attained has been with rice. The seed of two prolific and early yielding varieties and one prolific and late yielding variety is now in process of distribution. Ten thousand pounds of seed were distributed free by co-operative societies in 1925-26 for demonstration purposes. Green manuring has also spread in the Orissa delta. Of one important problem in the delta, *viz.*, the crops which can best be grown in the cold weather on land where rice has been destroyed by floods, no decisive solution has been found but the experiments with linseed and *juar* are hopeful.

Ranchi.—Apart from cattle breeding which will be described later, the work on this farm and the small subdivisional farms linked with it consists chiefly in varietal experiments with rice and the growing of groundnut for distribution and of sugarcane on drained rice land for experimental and demonstration purposes.

Sepaya.—Apart from the earlier activities in regard to cattle breeding, useful work is being done in popularising Coimbatore cane No. 210, while tobacco growing experiments have resulted in the rapid spread of the crop in the Saran district where it was almost unknown before.

The greatest success so far achieved with the introduction of an improved variety is not, however, connected with any one farm. It is the introduction of *dahia* rice, which is an early and heavy yielder, and, by 1924-25, had spread over about 23,000 acres in South Bhagalpur, South Monghyr and the Santal Parganas in South-East Bihar. Since that year, there has been a further increase in this area sown with this variety. The cultivation of groundnut has also been taken up on a considerable scale in the Patna division as the result of departmental demonstration.

Attention is being paid in all four ranges to manuring; in particular, the use of gypsum has been introduced on a considerable scale in South Bihar. Experiments are also being conducted on the farms to determine the value of different types of phosphatic manure and the possibility of a great demand in the near future for this and other kinds of fertilisers is foreseen as the result of the tests already made by the Agricultural Department and of the organised propaganda which has now been begun by sellers of artificial manures on the basis of these tests.

Important experiments have also begun at the Purnea* farm in North-East Bihar into the relative values of different varieties of jute for local cropping.

Agricultural engineering.—The Agricultural Engineer has a workshop at Sabour which is also his headquarters. Research on water-lifts is conducted there and there is so great a demand for the *rahat* pumps (iron Persian wheels) that arrangements are being made to have them manufactured by private firms, as the workshop cannot meet the demand and it is also hoped that manufacture by private agency will enable the pump to be sold cheaper. Repairs to farm implements, machinery and boring plant are also carried out at the workshop at which, as far as possible, all boring appliances are also manufactured. Experiments are also being made with *gur* furnaces and cane mills. But the main duty of the Agricultural Engineer is well boring. There is a considerable demand from cultivators for borings in ordinary wells and orders for tube wells with strainers are now being received. There were in all 201 such applications in 1926-27. The staff of the Agricultural Engineer has been strengthened by the appointment of an assistant engineer and three separate sections have been constituted for the three alluvial tracts, each under a supervisor, *viz.*, one in North and one in South Bihar and a third in Orissa.

The Agricultural Engineer is also responsible for small *bunds* in South Bhagalpur division. A typical scheme is the one carried out at Koilwa in 1925-26 which will control 200 acres. These *bunds* combined with drainage are of especial importance in Chota Nagpur. It is, as the Report of the Agricultural Department for 1925-26 remarks, "the one direction in which a really great advance seems possible in Chota Nagpur—the retention of the monsoon rainfall at a high elevation above the paddy land and the drainage of the lowest paddy land for sugarcane and garden crops."

6. LIVESTOCK WORK AND THE VETERINARY DEPARTMENT.

Both oxen and buffaloes, especially the former, are a very important feature of agriculture in Bihar and Orissa, as not only are they required in large numbers for agricultural operations within the province but, with the assistance derived from the neighbouring pastures of Nepal, there is a large annual export to Bengal. A comparison of the census of 1920 with that of 1925 yields the following results:—

——	1920	1925	Increase or decrease
Bullocks	6,256,310	6,826,415	570,105
Cows	5,617,449	5,751,480	134,031
Young stock	4,482,405	4,653,065	170,660
Male buffaloes	802,570	826,599	24,029
She buffaloes	1,515,301	1,555,441	40,140
Young stock	1,038,168	1,022,221	— 15,947
	19,712,203	20,635,221	923,018

* This farm of 190 acres is privately owned by the Tournament Trust Committee, but is controlled by the department.

Various attempts have been made in the past, notably at the Sepaya farm, to improve the breeds of cattle, but so far, with little result. Continuity of policy has been lacking and as the distribution of bulls and male buffaloes has been made on no settled plan, any good that might have been effected has been dissipated. Although dairy herds have been maintained at the Sabour and Ranchi farms and a third herd has recently been established at the Monghyr farm on the advice of the Agricultural Committee of 1922, nothing has been done to improve draught cattle since the abolition of the breeding herd at Sepaya in 1922. A cattle committee was appointed in 1925 to consider the state of cattle breeding in the province generally. The committee reported in favour of breeding a dual purpose animal and their recommendations that a large breeding farm should be established at Patna under the Veterinary Department, that a breeding herd should be attached to the Cuttack farm in Orissa and that a herd of Murrah buffaloes should be maintained at Sepaya farm have all been approved. The Veterinary Department will, therefore, henceforward, have an interest in breeding. Hitherto, breeding operations have been entirely conducted by the Agricultural Department, but the local Government are now disposed to think that livestock and dairying work should be brought as far as possible under the control of the Veterinary Department and they have decided that the present Director, Civil Veterinary Department, should combine the duties of livestock officer with that of Director. Sheep and goats are both important elements in the livestock of the province, numbering, as they do, 1,239,000 and 5,765,000 respectively, but so far no attempt has been made to improve their breeds.

The Civil Veterinary Department was separated from the Agricultural Department in 1920. For the purpose of administration, the whole province is divided into three ranges, North, Central and South. The first is in charge of a deputy director, who, like the Director, is a member of the Imperial Veterinary Service, recruitment for which has now ceased. The third was also in charge of an officer of the Imperial Veterinary Service, but the vacancy which arose on his death has been filled by the appointment of an officer of the Provincial Veterinary Service. As the Director has now taken up the additional duty of livestock officer, it is necessary to relieve him of the Central range which is at present under his direct charge and to appoint a third deputy director. At present, there are only three officers in the Bihar and Orissa Provincial Veterinary Service, two assistant directors on Rs. 250—50—750 per month and an officer who, after obtaining a veterinary degree in England, is now taking a post-graduate course at Muktesar and has been appointed temporarily for a year on a special rate of pay of Rs. 300 per month pending a decision as to the formation of the new Superior Provincial Service to take the place of the Imperial Veterinary Service.

Owing to the comparatively recent origin of the department and the shortage of staff, its activities have in the past been chiefly concentrated on the control of contagious diseases. The charge of the new breeding centre at Patna and still more the decision to create a veterinary

college, with its opportunities for prosecuting research, will greatly widen its outlook. At present, any investigation beyond the resources of the three small laboratories, one for each range, has to be referred to Muktesar.

Hitherto, the subordinate veterinary officers have been trained at the Bengal Veterinary College. The new college, which will be at Patna, will be run in connection with the proposed cattle breeding and dairy farm there. The students will thus have an opportunity of getting an insight into animal husbandry and dairying which no other veterinary college in India provides. It is intended to start with a three years' course only, in view of present financial conditions, but the advantages of a four years' course and of affiliation to Patna University, which the extra year will make possible, will not be lost sight of. The college will not supply recruits for the new Superior Provincial Veterinary Service. The intention at present is to obtain these recruits from among students sent to England who return with a veterinary degree.

The subordinate staff consists of 124 veterinary assistant surgeons, 13 inspectors of the work of these assistants, 18 staff and reserve inspectors, 4 laboratory assistants and 1 cruelty inspector employed by the Patna Municipality. The veterinary assistant surgeons are on a scale of Rs. 50—10—125 with certain allowances; three of the laboratory assistants receive Rs. 100-125 per month and the fourth is on Rs. 60-80 per month. The cruelty inspector is on a special scale of Rs. 100 per month and is appointed temporarily for three years in the first instance.

The veterinary assistants are government servants but work under the district boards. They are paid by Government, the district boards making a contribution to Government in respect of their pay (five-sixths in the case of the stationary and one-half in the case of the touring assistants). The assistants are partly touring and partly stationary. The intention is to have one fixed hospital, in charge of an assistant, in each subdivision and two touring assistants. As there are 63 subdivisions and only 27 stationary and 97 touring assistants, the staff is by no means complete, but many district boards are reported to be genuinely unable to do more than they do at present. But undoubtedly the proportion of their expenditure on veterinary matters to their total receipts and to their expenditure on education and medicine is disappointingly low. Thus, no district board in 1925-26 spent more than two per cent of its total receipts on veterinary work (including the cost of sera and vaccine) and no fewer than nine out of the twenty boards which sent in returns spent less than one per cent. On education, on the other hand, no board spent less than ten per cent or on medicine less than four per cent of its total receipts.

Inoculation against rinderpest, hæmorrhagic septicæmia, anthrax and black quarter is carried out. In 1926-27, the total inoculations were 147,731 and in the preceding year, 170,153. The marked difference between the two years was due to the abnormally low incidence of rinderpest in 1926-27. Inoculation by the simultaneous method has

not so far been employed. In 1926-27, 3,915 in-cases and 42,421 out-patients were treated and 1,612 castrations were performed in the veterinary hospitals. In the same year, the travelling dispensaries performed 1,119 castrations and treated 38,821 animals for contagious, and 69,247 animals for non-contagious, diseases.

7. IRRIGATION.

In 1926-27, the area irrigated from all sources amounted to 5,301,835 acres, or about eighteen per cent of the total area sown. Of this area, no less than 3,584,000 acres were under rice and practically all the remaining acreage irrigated was under food crops of one kind or another.

The sources of irrigation are various ; 1,832,576 acres are irrigated by canals, nearly half of which are privately owned, 1,591,171 acres and 620,197 acres are irrigated by tanks and wells respectively and 1,257,391 acres derive their water from various sources, the chief of which is the impounding of flood water by temporary *bunds*.

The major part of the large area irrigated by privately owned works is situated in the Gaya district and in the southern portion of the Patna district. These irrigation works are maintained by the landlords, and, as a rule, the rents are paid in kind and not in cash. This brings in a large return to the landlord on the capital which he expends on irrigation. The tenants as a class tend to apply for a commutation of their produce rents into cash rents. This commutation it is within the power of Government to grant. But Government have to consider that the tenants owing to their inability to combine among themselves are, as a class, unable to keep up the irrigation works, so that general commutation throughout the district would result in extensive deterioration in cultivation.

The government canals are in the north and south-east of the province. In the north are the Son, Tribeni, Dhaka and Teur canals ; in the south-east are the Orissa canals and the Orissa Coast Canal, the latter being for navigation only. There is a separate department for irrigation with a Secretary who is also Chief Engineer at the head of it. There are two local circles of administration—the Son and Orissa, each in charge of a superintending engineer.

The Son canals, which were opened in 1875, take off in two main branches from the river Son, one on the east and one on the west bank of the river. They irrigate an average area of 564,441 acres on the south bank of the Ganges at a capital outlay per acre irrigated of Rs. 48. The interest earned averaged 5·89 per cent for the three years ending 1925-26. The Tribeni, Teur and Dhaka canals all lie to the north of the Ganges and close to the Nepal boundary. The Tribeni Canal was completed in 1912 and irrigates 66,588 acres from the river Gandak at a capital outlay per acre irrigated of Rs. 122. The revenue earned averaged only 0·62 per cent on this outlay for the three years ending 1925-26. The Dhaka Canal was opened in 1907 and provides water for 14,345 acres at a capital outlay of Rs. 42 per acre irrigated and gave

a return of 1·01 per cent over the same period. The Teur Canal irrigates an average area of just over 2,000 acres. It was originally a private irrigation system. Both the Tribeni and the Dhaka canals were constructed as protective works.

The Orissa canals in the south-east date from 1865. Their main function is to protect portions of the Mahanadi delta against flooding. The area protected is 562,114 acres and the cost Rs. 48 per acre. The average area irrigated is only 247,224 acres. For the three years ending 1925-26, these canals returned only 0·48 per cent as interest on capital outlay.

On all these canals, the cultivator is charged for water on an acreage basis and he can enter into a long-term lease at reduced rates or pay for the water by the season and the crop. The details of the arrangements for long leases differ for the different canals, but in no case does the lease cover watering for the whole year. In the case of the Orissa and Son canals, it covers watering from June to March. Waterings required in April, May and part of June for such crops as sugarcane, cotton and indigo have to be paid for as extras. On the Orissa canals, only some 260 acres are not irrigated on the long lease system. Two-thirds of the acreage irrigated by the Son Canal and nearly one-half of the acreage irrigated by the Dhaka Canal are under this system. Long leases are less popular on the Tribeni Canal and cover only three-tenths of the area irrigated. The long lease system shows signs of falling into disfavour on the Son canals.

No schemes for new canals are under consideration and, as will have been observed, there has been no construction since 1912. Extensive additions could advantageously be made to the areas irrigated in Bihar north of the Ganges and such works would incidentally be of service in drainage, but there is little likelihood of development as the head waters of all available rivers lie within Nepal and the necessary control is, therefore, lacking.

The Son and Orissa main canals are open to navigation. Including the Orissa Coast Canal, there are 500 miles of navigable canals in the province.

Of the total area under tanks (1,591,000 acres) and wells (620,000 acres) more than one-half in each case is located in the Patna division.

Wells are a great feature in the cultivation of South Bihar. In this part of the province, the rainfall is too light to admit of rice cultivation on an important scale, but wells make it possible to grow vegetables (including potatoes and onions) and spices. Well irrigation is also utilised for sugarcane and even for wheat. It has been found that the supply from a percolation well can often be greatly increased by driving a 3″ tube into lower water-bearing strata. There is a demand for these borings and an even greater demand from zamindars and others for tube wells proper. The engineering section of the Agricultural Department has recently acquired plant for making tube wells. Well irrigation is not as yet practised in Orissa, though a demand for tube wells is now arising and the Agricultural Department have posted a well boring

supervisor to this area. Well irrigation is practised in Chota Nagpur but is unimportant. Where well irrigation is practised on such an extensive scale as it already is in the Patna and Tirhut divisions, the efficiency of water-lift appliances becomes important and there is an increasing demand for iron Persian water wheels.

Outside the Patna division, the largest area irrigated by tanks lies within the Chota Nagpur plateau. The future expansion of irrigation in the province undoubtedly lies with small schemes and, more particularly, with wells, the responsibility for which rests with the Agricultural Department. The engineering section of that department has recently been reorganised and the field work distributed into three sections, North Bihar, South Bihar and Orissa. The iron Persian wheel is being adapted at Sabour to meet local requirements in the way of water-lift as motor water-lift is not considered economical where the capacity of the well is less than 12,000 gallons a day.

River conservancy is confined to the Ganges and is devoted to keeping the river open for navigation during the period of low water from October to May.

8. FORESTRY IN RELATION TO AGRICULTURE.

7,514,743 acres are shown in the Season and Crop Report for 1926-27 as under forests. Of this area, only 2,373,533 acres are under the management of the Forest Department. The forest areas are situated chiefly in the Chota Nagpur division, in the Angul, Puri and Sambalpur districts of Orissa, in the Santal Parganas and in the Champaran district of the Tirhut division.

In 1926-27, grazing was provided in the forests under State management for 63,500 buffaloes, 287,000 cows and bullocks, 55,100 sheep and goats, 5 camels and 35 other animals.

This is, of course, the merest fraction of the total livestock of the province, since the total number of cattle alone in Bihar and Orissa is estimated at 21 millions. The value of free grazing or grazing at reduced rates was, in 1926-27, Rs. 1,17,597. In the same year persons with rights in the forests took away forest produce valued at Rs. 1,43,291. The total grazing and forest concessions in 1926-27 were, therefore, valued at Rs. 2,60,888.

9. GENERAL EDUCATION.

The total expenditure on education at recognised institutions in the province in 1926-27 was 177 lakhs of rupees as compared with 114 lakhs in 1920-21 and 63 lakhs in 1912-13. Of the expenditure in 1926-27, 40·69 was contributed by Government, 27·95 came from funds of the local boards, 18·42 from fees, and 12·94 from other sources such as endowments and private subscriptions. The cost per scholar was Rs. 16-10-2. The average cost per pupil at different types of institutions is stated in the Table of figures given below.

In 1921, there was in Bihar and Orissa excluding the Feudatory States a population of some 16,765,000 males and 17,239,000 females. Of the former 989,464 or 5·9 per cent and of the latter 119,030 or 0·69 per cent were under instruction.

Of the male pupils, about 949,700 were attending institutions recognised by the Education Department. In the following Table are given particulars of the institutions for males, scholars in attendance and cost per head of each pupil :—

Kind and number of institutions	Number of pupils	Percentage at each institution	Cost per‡ pupil
			Rs. a. p.
1 University	....	....	....
10 Arts Colleges	3,467	0·35	281 4 8
5 Professional Colleges	1,021	0·10	521 5 0
135 High Schools	38,197	3·84	46 7 6
563 Middle Schools	59,114	5·95	20 5 8
27,457 Primary Schools*	875,666	88·07	5 13 4
476 Special Schools†	16,762	1·69	99 6 6

*Includes 802 night schools. †Includes 2 night schools.

‡Calculated on direct expenditure only (*i.e.* excluding cost of direction, inspection, building, etc.)

The University of Patna, which was founded in 1917, is of the examining type. In Bihar and Orissa, as elsewhere, the recommendations of the Calcutta University Commission of 1917 attracted widespread interest in educational circles. The provision of facilities for education up to the intermediate standard before the student proceeds to the degree stage has taken the form of adding two additional classes to certain high schools in preference to that of establishing intermediate colleges.

An important step in the education of the Medical and Health services of the province was taken in July 1925, when the Prince of Wales Medical College was opened. The college teaches up to the M.B.,B.S. standard and a Faculty of Medicine has been added to Patna University.

The policy of Government in regard to high schools is to maintain one such school in each district in order to set an example to high schools maintained by private agency. At present, Government have 24 such schools for boys. All government schools will teach elementary science and also manual training. Drawing is already compulsory.

In this policy and in other plans for improving secondary education, the Government receive assistance from the Board of Secondary Education, the chairman of which is the Director of Public Instruction. All educational interests, from the university downwards, are fully represented on the board which includes a representative of female education. The board meets three times a year.

English is taught in 321 of the 563 middle schools for boys. Almost all the 242 vernacular schools are now under the control of district boards and municipalities. There is a tendency for vernacular schools to develop into English schools. There is a distinct cleavage of opinion in regard to this tendency. The demand of public men and many experienced teachers is for education in the vernacular at least up to the matriculation stage, and, in response to this demand, experiments

are being made in using the vernacular as the medium of instruction in the upper classes of high schools. Parents, on the other hand, almost invariably desire their children to be taught English as soon as possible.

No specific instruction in agriculture has so far been given in secondary schools, but an experiment is about to be tried of attaching to certain schools a garden of about one-quarter of an acre. A teacher from each of the selected schools will be sent for a short course of training under the supervision of the Director of Agriculture at Sabour. Teachers will be encouraged to associate the work done in the garden with the teaching of other subjects.

Illiteracy is as great a problem in Bihar and Orissa as in other parts of India. The percentage of literates of 20 years of age and over returned in the census of 1921 was 12·6 for males and 0·7 for females. The steps that must be taken to improve the position in regard to males are known, *viz.*, improvement in the quality of teaching, the stoppage of wastage after the completion of the first year at the primary school and the bringing of the total boy population under instruction. As regards the quality of teaching, the pay of teachers in vernacular middle schools and in primary schools is very low, ranging as it does from Rs. 30 to Rs. 50 per mensem in a middle school for a certificated teacher to Rs. 5 rising to Rs. 10 per mensem for an untrained teacher in a primary school. As regards wastage, the fact that in 1926-27, seventy-five per cent of the pupils in all schools (primary and secondary) were in the two lowest classes of the primary schools speaks for itself. As regards the third point, there has, it is true, been a rapid increase under the present voluntary system in the number of boys attending school—some 284,000 in the six years 1921-22 to 1926-27 but the percentage of boys of school-going age actually at school is still only 39·1.

An exhaustive investigation into the whole situation in regard to primary education was made by Government in 1925. It was based on programmes for the education of eighty per cent of the male school-going population submitted by local authorities. Orders were issued separately on each programme in accordance with certain general principles as to the action to be taken, chief among which is the abolition as soon as possible of the single-teacher school and direct management by each district board of the primary schools in its area except where really satisfactory local committees can be formed. The extra expenditure in carrying out all the programmes was estimated to amount to Rs. 74 lakhs. Free education in the lower primary stage would cost another Rs. 19½ lakhs. Owing to the difficulty of finding funds for this heavy increase in expenditure, the Government had to decide in 1925 against the introduction of any comprehensive scheme of compulsion in rural areas although the necessary statutory provision for this already exists under the provisions of the Act passed in 1919. Certain local bodies are, however, anxious to try the experiment of compulsion in limited areas and the Government have stated that they will be prepared to consider sympathetically any proposals to this end, the more especially as such experiments should be valuable for future guidance. So far, one rural area only has introduced compulsion, the Banki Union in Cuttack. It

is too early yet to draw any conclusions from this experiment. Three more rural areas have begun recently to introduce compulsory primary education, but it is not yet effective.

In addition to the ordinary primary schools, there were, in 1926-27, 802 night schools for males with an attendance of 17,581 pupils. The co-operative organisation is not specially identified with the movement for adult education, but it is in a special way identified with a forward policy in education as it is expected of co-operative banks and unions that they shall foster primary education in the areas in which they operate. The attention of the local authorities has again been drawn by the Government, as part of their orders on the 1925 programmes referred to above, to the advantages to be derived from making block grants to these banks and unions in view of the opportunities which they possess through the local co-operative officials for supervising the proper expenditure of such grants.

Female education in Bihar and Orissa, as elsewhere, presents very special problems and, as the figure of literacy returned at the 1921 census all too clearly shows, the results so far have been meagre. Moreover, over ninety-five per cent of the 115,785 girls who, in 1926-27, attended recognised institutions were in primary school and with the wastage prevalent in these classes comparatively few of these pupils can be expected to become literate. There has been an unfortunate period of actual retrogression in the movement for female education in the province from which recovery is only now being made. A special enquiry was made into the cause of this but no more tangible reason could be discovered for the decline in the number of girls attending educational institutions which, at no time, has been large, than the complete indifference of both men and women to the education of their daughters. During the six years 1921-22 to 1926-27 the number of girls attending school increased by only 11,600. Expenditure by local boards on girls' schools is also showing an upward tendency and the supply of trained teachers, though still far short of the demand, is steadily increasing. These are encouraging signs, but with an attendance figure which still only amounts to 4·6 of the total number of girls of school-going age in the province, it is obvious that almost everything still remains to do.

10. CO-OPERATION.

At the end of 1926, there were 7,614 agricultural societies, 93 of which were on a limited liability basis. The total membership of 205,825 gives an average of 27 only for each society. In 1912, there were 491 agricultural societies and 39 non-agricultural societies with a total membership of 27,207 or an average of 51 persons for each society.

The total working capital of the agricultural societies at the end of 1926 amounted to nearly two crores of rupees; to this amount share capital contributed 4·4 per cent and deposits six lakhs, or 3·1 per cent, of which over four lakhs represented deposits by members in their societies. The reserve fund amounted to nearly twenty lakhs or 10 per cent. The bulk of the working capital was borrowed from provincial or central banks, advances from which at the end of the year amounted to Rs. 164·6 lakhs

or eighty-two per cent of the total working capital of the societies. The amount borrowed from Government was practically negligible, the outstandings at the end of the year being only Rs. 10,743. Sixty-six lakhs were given out to members in loans during 1926. The average loan worked out to Rs. 31 a head. In 1925 thirty per cent of the loans were in relief of debt and only forty-three per cent could be described as given for productive purposes. As much as thirteen per cent was borrowed for payment of rent (three rent-paying societies having just been started) and four per cent was lent to defray the cost of marriage and other ceremonies. It was reported in 1926 that there was little change in these figures.

The movement is especially strong in South Bihar, around Ranchi and in the Cuttack and Puri districts of the Orissa division. It has gained no foothold in the Feudatory States. Elsewhere it is fairly well represented in every part of the province except in the south part of the Chota Nagpur division and the Santal Parganas where it is very weak.

Government exercise a general supervision over the movement through the Co-operative Department which consists of the Registrar, one deputy registrar, nine assistant registrars and one chief auditor. The actual audit is carried out by the Bihar and Orissa Co-operative Federation which is subsidised by Government and employs a staff of seven divisional auditors each in charge of a circle, and seventy-one local auditors. The aim is to audit each society once a year. Test audits are also carried out by the nine assistant registrars and the divisional auditors. The classification of the 6,133 societies audited in 1926 was as follows :—

A (model)	..	5 per cent.
B (good)	..	14·5 ,,
C (average)	..	68·5 ,,
D (bad)	..	10 ,,
E (hopeless)	..	2 ,,

At present there are 216 guarantee unions to which nearly 2,000 primary societies are affiliated.

In addition to audit, the federation makes itself responsible for training managers, local auditors, inspecting and bank clerks, etc. It employs a development officer who is responsible for propaganda and the production of the Federation Gazette. The federation draws its funds for these and other purposes mainly from the societies, but Government also makes a contribution. The federation holds an annual congress.

A divisional board has been set up in each of the five civil divisions to act as a centre of co-operative activity. On the average, two meetings a year are held for discussions, etc.

Of the sixty-three central banks, thirty-eight in 1926 assisted in promoting agricultural development. In addition to fostering the spread of groundnut and sugarcane cultivation, ploughs and sugarcane crushers are bought and it has recently been decided, on the advice of the Government Development Board,* that these banks can

*This Board advises Government on important questions concerning the departments in charge of the members of the Board, *viz.*, the Agricultural, Industries, Civil Veterinary, Co-operative and Forest departments.

properly take up the purchase of manures. Grants are obtained from district boards for the development of agriculture and the promotion of primary education. In times of epidemics, the banks employ doctors and distribute medicines to primary societies.

At the apex of the credit side of the movement stands the Provincial Bank, which has a working capital of Rs. 51½ lakhs and made a profit of over Rs. 54,000 in 1926. It has an overdraft of Rs. 2,85,000 with the Imperial Bank against government securities.

Societies formed specifically for purchase and sale are unimportant. There are, however, ninety-three grain storage societies (*golas*) with a total membership of 27,564 which, together with the two central grain banks started at Sambalpur and Bargarh, made a net profit in 1926 of over Rs. 21,000. Their object is to give loans of paddy to their members at reasonable rates and to create a reserve stock of paddy for use in times of scarcity and famine.

There is only one dairy society—the Mayaganj Gowala Society. It is making a profit, but its operations are unimportant.

11. COMMUNICATIONS AND MARKETING.

Three main line railways pass through Bihar and Orissa—the Bengal and North-Western Railway in North Bihar, the East Indian in South Bihar and the Bengal Nagpur Railway in Chota Nagpur and Orissa. The milage has increased from about 3,000 miles in 1911-12 to about 3,500 at the present time. Recently, lines of great importance to the coal fields of the province have been constructed or sanctioned for construction—notably the Central India Coal Fields Railway, the Chandil Barkakhana Chord, which will open up the Karanpura field, and a line linking the Talcher field to the Bengal Nagpur main line to Madras. Except in the south of the province, where the Feudatory States have yet to be opened up, the railway communications of the province are good, when due allowance is made for conditions in the hilly tract of Chota Nagpur.

There are over 28,000 miles of roads, of which 3,600 are metalled and 24,600 unmetalled. Local authorities are responsible for some 26,000 miles of these roads. The Grand Trunk Road and the Orissa Trunk Road and other arterial communications are in charge of the Public Works Department. The Grand Trunk Road is the great thoroughfare for cattle from up-country.

The district boards spend about one-third of their income on communications. The Government do not ordinarily make grants to the boards for public works, although such grants are freely given for the expansion of education and of the medical services and for the improvement of sanitation. A rough track which is apt to be under water during the monsoon if the village site is low lying, or a water course if it is not, connects the village with the nearest district board road. But during the dry season, from December to June, these tracks are, as a rule, quite passable for bullock transport.

A very large proportion of the foodstuffs grown, especially in the rice-growing tracts, is consumed locally. Bihar imports from Nepal, and, in

the Chota Nagpur division also, there is always a net import. The Orissa division alone has always a surplus. The net export of foodstuffs is therefore not large. Where it takes place, the cultivator usually disposes of the grain on the threshing floor to a middleman, if he is in a small way. If he is a bigger man or of the landlord class, he may both store and subsequently market his surplus but very often even the bigger men will have disposed of their grain direct to some big exporting agency which may be financing them. Each village will usually have one large cultivator who stores more grain than he requires and will lend it out if there is a shortage of seed at sowing time.

Among the regular exports, oil-seeds, sugar, tobacco, jute and other fibres and lac are the most important. Vegetables and fruit are exported to Bengal and the United Provinces and the trade in *ghi* is considerable.

For the disposal of these products (except fruit and vegetables which find their way direct to the railway) as well as for general local trade there are 432 principal and 2,464 minor markets which are maintained by the landlords or their lessees, the cost being met by tolls or a rent charge. The frequency of these markets (they are held once or twice a week) and the fact that the cultivator is seldom more than from five to six miles from a market and is usually much nearer are noteworthy. There is a brisk trade in cattle, especially in buffalo bullocks, at the big cattle fairs. There is also a large trade in these buffalo bullocks between Bihar, where milch buffaloes are kept in great numbers, and Chota Nagpur, where the home-bred cattle tend to become too small for local cultivation requirements, owing partly to deficiencies of bone-growing material in the soil and partly to the pressure of the cattle population on the available grazing areas. There is also a considerable export, chiefly to Bengal, of bullocks and cows from Bihar.

12. LOCAL SELF-GOVERNMENT.

Provincial Government in Bihar and Orissa is on the same pattern as in other Indian provinces. The Governor acting with two Ministers administers the "transferred" departments, *viz.*, Education, Agriculture, Veterinary, Industries, Co-operative Societies, Registration, Local Self-Government, Medical, Public Health, Excise, and Roads and Buildings. The "reserved" subjects are dealt with by the Governor acting with two Members of his Executive Council.

Local self-government in rural areas within the province is regulated by the Bihar and Orissa Local Self-Government Act of 1885 with subsequent amendments and the Village Administration Act of 1922.* The various local authorities are (1) district boards, (2) local boards and (3) union boards and *panchayats* under the new Village Administration Act which are rapidly superseding union committees.

* Except in the Santal Parganas where the Bengal Cess Act is in force and Sambalpur where the Central Provinces Local Self-Government Act is in force. There are also special arrangements for the local self-government of the district of Angul.

Under the first-mentioned Act, a district board is set up in 18 out of each of the 21 districts of the province. These district boards have a maximum membership of 40 persons. Three-fourths of the members are elected and hold office for three years. Not less than one-third of the remainder are required to be persons who are not salaried servants of Government. The chairmen of all the district boards except those in the Chota Nagpur division are elected. Their main duties are in regard to education and the Act prescribes that every district board shall be responsible for the maintenance and management of all primary and middle schools under public management within the district and also of medical relief, roads and bridges, sanitation, water supply and vaccination. A district board may also, *inter alia*, incur expenditure on irrigation works for the relief of famine or scarcity, offer rewards for the destruction of noxious animals within the district, hold fairs and exhibitions of cattle, country produce and agricultural implements, establish and maintain veterinary dispensaries and veterinary staff, make provision for the improved breeding of animals, make grants-in-aid of measures for improving agriculture and undertake any other local work likely to promote the health, comfort or convenience of the public. The road cess, which is fixed annually by each district board, provides about fifty per cent of the finance required and Government grants-in-aid about twenty-nine per cent. A board may raise loans for the purpose of carrying out any of the provisions laid down in the Local Self-Government Act. The provincial Government exercise a certain amount of supervision over the finance, budget estimates and the auditing of accounts of the district boards, and its hands have been much strengthened in the last respect by the passing of the Local Fund Audit Act in 1925-26.

Apart from government grants, the income of the boards has remained almost stationary for several years and the increased expenditure on education and public health—the two subjects in which the boards take the keenest interest—has been met largely from government grants and partly by incurring less expenditure on communications.

The local boards are agents of the district board. There is one local board for each subdivision * of which there are two to four in each district. The members of the local board are the members of the district board elected in the particular subdivision together with such number of additional persons not exceeding one-third of the elected members as the local Government may allow. The district boards appoint these additional members. The local boards seldom contain any officials. They are entirely dependent on the district board for funds.

Union committees are elected bodies charged with certain administrative duties in a village or group of villages. These committees are agents of the district board and are in charge of less important roads, wells, primary schools, local conservancy and sanitation and generally of

* Except in three districts in Chota Nagpur and in Angul and the Santal Parganas, where there are no local boards, and in Hazaribagh and Manbhum, where there is only one.

dispensaries. They have power to raise local taxation ; but in most cases their funds are derived mainly from grants. These committees are now being superseded by the union boards constituted by the Village Administration Act of 1922. Union boards are elected bodies, the members of which hold office for three years. The minimum number of members is fixed at three and the maximum at twenty. Each union board, subject to the control of the district board and to such rules as the local Government may prescribe, is ordinarily responsible for primary education, medical aid, conservancy, sanitation, pounds, water supply and village roads. The union board may also, with the sanction of Government, be made responsible for the maintenance of the village police. It may also undertake " any other local work of public utility likely to promote the health, comfort, convenience or material prosperity of the public, including the development of agriculture and village industries....." (Section 41 (*i*) of Village Administration Act.) So far this provision has proved of little practical importance.

The union board may impose a tax upon the owners and occupiers of buildings within the union provided that the amount assessed on any person in any one year shall not exceed Rs. 30 and any person who in the opinion of the union board is too poor to pay the tax may be exempted altogether from assessment. The proceeds of this tax, of fines, fees or costs levied by *panchayats* and contributions from the district board are paid into a union fund. In fact, however, union boards are largely financed by district boards. For the first two years after a union board has come into existence, its district board must make a suitable grant-in-aid and must also contribute not less than the amount of any tax imposed by the union board. By the end of 1925-26, 153 union boards had been created. But, on the whole, they have so far been a disappointment. The members of the union board are averse to imposing taxation and the creation of union boards is not popular with district boards which take the view that it is impracticable without crippling their own finances to divert to these small local areas more money than was previously being spent on them. As was truly remarked in the Bihar and Orissa Administration Report for 1925-26: " The progress of local self-government in every unit from the highest to the lowest will depend on the willingness of the people to tax themselves and to devote themselves to the service of the public without remuneration."

To complete this sketch of local self-government, it should be mentioned that a certain measure of judicial decentralisation has been attempted by the formation of *panchayats* with power to try petty criminal and civil cases. The area covered by a *panchayat* may be the whole of the area covered by a union board or it may be any number of ' circles ' or subdivisions of the union board area. The members of such *panchayats* are elected by union boards from among their own members and their period of office is also limited to three years. The local Government has power to direct the establishment of *panchayats* in any area where no union board exists.

13. PUBLIC HEALTH AND SANITATION.

Of the epidemic diseases, cholera is the most dreaded especially in the densely populated division of Bihar. The mortality rate from cholera is 2·2 per thousand, the average (ten-year) mortality rate from all causes being 33·3 per thousand. The climatic conditions are favourable to the spread of the disease for many months in the year and the average mortality from this cause is nearly 90,000 annually. A special corps of ten medical officers is kept at headquarters for dispatch to epidemic centres and one hundred vaccinators are kept in reserve during the danger period which lasts from the beginning of April to the end of September.

As elsewhere, fever is the greatest single factor in the mortality rate, but it is certain that the proportion of deaths attributed to this cause—22·9 per thousand as against a general mortality rate of 33·3 per thousand—is much too high. Few of the deaths ascribed to fever are due to malaria, but should rather be put down to pneumonia, enteric fever, phthisis, *kala-azar* and other fevers. Nevertheless, throughout the province malarial outbreaks on a serious scale do occur, especially from March to the beginning of May and again from July to October. Quinine treatments are placed on sale chiefly through the agency of postmasters and, during the epidemic outbreak of 1925-26 in Orissa, 1,090 lbs. of cinchona febrifuge were distributed free.

In Orissa, diarrhœa and dysentery are very prevalent and filariasis (elephantiasis) is common. The treatment of the latter disease by injections of antimony has been found to be beneficial.

Hookworm is widespread throughout the province. Leprosy is also prevalent, but the work of Sir Leonard Rogers and others has resulted in definite hope of cure in cases taken early, and improvement in more advanced cases. Eight leper asylums are maintained and in spite of the prejudices of local authorities the treatment of lepers at hospitals and dispensaries is increasing—some 5,600 cases being treated in 1925-26 as compared with 3,700 in 1924-25. Plague is mildly endemic in certain parts of Bihar and the first quarter of each year shows a rise in mortality from it, with a more marked outbreak every four years or so, but, on the whole, there has been a steady decline in the mortality from this cause since 1905.

The average provincial death rate for the period 1916-1925 was 33·3 per thousand, but the figures for the last three years have been markedly below the average :—

1924	1925	1926
29·1	23·7	25·7

Up to March 1926, the Public Health Department consisted of four permanent officers only, the Director and three assistant directors in charge, respectively, of the North Bihar Circle, the South Bihar Circle and the Chota Nagpur and Orissa Circle. From March 1926, the department has been much strengthened by the inclusion in it of the following :—

Ten medical officers of health for special duties in cholera and other epidemics,

Three medical officers of health for the three important municipalities of Puri, Gaya and Patna,

Five school medical officers of health (assistant surgeons),

Five assistant medical officers of health (sub-assistant surgeons),

One lady school medical officer,

One officer in charge of the Public Health Bureau,

One chemical analyst,

One superintendent, Vaccine Lymph Depôt.

The officer in charge of the Public Health Bureau is also personal assistant to the Director.

The duties which this central Public Health Department undertakes will be sufficiently indicated by the titles of the posts. The assistant directors are inspecting officers who spend much of their time touring.

There is also a central Public Health Engineering Branch which prepares schemes for water supply and drainage for both the provincial Government and local bodies. Particular attention has recently been devoted to the necessity of improving the supply of drinking water in rural areas. Capital grants of the following amounts have been allotted to district boards:

1923-24	1924-25	1925-26
Rs.	Rs.	Rs.
86,700	45,000	3,95,000

The grants are made on the basis of a percentage of the estimated cost of constructing a certain number of new wells in each police station of every district. A sanitary school of instruction is maintained at Gulzarbagh where sanitary and health inspectors are given elementary training.

In addition to this central organisation, five district boards have adopted the scale of local public health organisation suggested by Government, *viz.*: 1 medical officer of health, 4 sanitary or health inspectors and 12 sanitary gangs. Government defray half the cost of such an organisation up to Rs. 10,000 in each district.

But it is not easy to get district boards to realise their responsibilities and the percentage of the boards' expenditure on sanitation to their total income shows no tendency to increase. In 1925-26, their expenditure was Rs. 6·83 lakhs or 4·68 per cent of their total expenditure.

The provision of medical relief in rural areas has proved to be a matter of great difficulty, but appreciable progress has now been made by the district boards (on whom the duty of providing medical relief primarily falls) towards the aim set before them by Government, *viz.*, that there should be at least one out-door dispensary with a sub-assistant surgeon, or an officer of similar qualifications, in charge in each of the 539 *thanas* or police stations in the province. So far, 476 such dispensaries have been established at which treatment for the commoner illnesses and injuries is obtainable. But only 19 of these dispensaries are in

charge of Government sub-assistant surgeons. The rest are staffed by medical officers recruited by the district boards. For the year ending 31st December 1925, 3,442,894 patients were treated in these dispensaries. But only a comparatively small proportion of the rural population has as yet reasonable access to medical relief, as the fact that one dispensary has at present to serve an area of 194 square miles and 77,133 people only too clearly shows. Special medical facilities for women (in particular the provision of trained midwives) in rural districts are still, unfortunately, almost entirely absent.

There is some tendency for local bodies to establish dispensaries in which the indigenous systems of medicine are practised; at present, it is the policy of Government to earmark its grants-in-aid of dispensaries for those at which the western system of medicine (allopathic) is practised. These grants-in-aid have been on a considerable scale and are being continued. Up to March 1925, Rs. 3¾ lakhs recurring and Rs. 12½ lakhs non-recurring had been distributed among the district boards and, in 1925-26, a further sum of Rs. 2½ lakhs recurring and Rs. 3½ lakhs non-recurring was distributed.

The higher forms of medical and surgical aid are provided by hospitals at district and subdivisional headquarters under the management either of the municipality or of the district board. These, unlike the dispensaries, contain wards for the reception of in-patients. They are chiefly staffed by government assistant surgeons whose pay is borne Rs. 3½ lakhs non-recurring by Government.

In urban areas, there are important hospitals including a large hospital for women at Patna. There are also special hospitals for women at Gaya and Bettiah in charge of doctors belonging to the Women's Medical Service. But these institutions can contribute but little to the medical relief of the rural population.

A great advance has recently been made in the facilities for medical education available in the province by the establishment of the Prince of Wales Medical College at the Patna General Hospital. The college is affiliated to the University of Patna and students can obtain the degree of M.B., B.S. The first year class was opened in July, 1925. This new college has first class equipment, and should be a most important factor in providing trained medical men for the country-side. In addition, the province maintains two medical schools for the training of sub-assistant surgeons. One of these is at Cuttack in Orissa and the second is now at Darbhanga in Bihar, where it was moved from Patna in 1925 in order to make room for the new Medical College.

REFERENCES
Boundary Province, State
do. District
Road Metalled
do. Unmetalled
Standard Gauge Double Line
do. do. Single Line
Metre Gauge
Other Gauges
Experimental Farm
Seed Farm
Demonstration Farm
Cattle Farm
Educational Farm
RAJPUTANA AGENCY
C. I. AGENCY
C. PROVINCES
MADRAS PRESY
MYSORE
THE DANGS
BOMBAY
Ratnagiri
BOMBAY PRESIDENCY
Scale 1"=40 Miles.
1928

BOMBAY

1. GENERAL FEATURES.

The Presidency of Bombay, including Sind, has an area of 187,000 square miles and a population of 26·8 millions. The British districts alone contain an area of 124,000 square miles and a total population of 19·3 millions. The presidency is thus somewhat bigger than Great Britain and Ireland combined. It has a coast line of 1,534 miles on the west, and it extends from Baluchistan in the north to Madras in the south and is bounded on the east by the Nizam's Dominions, the Central Provinces and the Central India States.

The presidency covers 14 degrees of latitude from 14° to 28° north and exhibits considerable variations both as regards climate and physical features. Excluding Sind (which is dealt with separately) the presidency may be divided into four divisions, Gujarat, Deccan, Karnatak and Konkan.

The northern section, Gujarat, stands slightly above sea level and has a fertile soil and a dense population. It is sometimes called the Garden of India. It is watered by several rivers, the most important of which are the Narbada, the Tapti, and the Sabarmati. The northern part comprising Ahmedabad and Kaira forms part of the great alluvial plains of northern and central India. The soil here is formed from gneissic and metamorphic rocks and is alluvial and deep. It varies from drift sand in the north to fertile loam in parts of Kaira. The southern Gujarat tract is also essentially alluvial. The alluvium is deep and has all the characteristics of black cotton soil. The Panch Mahals tract differs from anything found elsewhere in the presidency. It is an undulating area in which the soil is shallow in the higher lands, while the low lying areas are composed of deep rich loam.

In the centre of the presidency is the Deccan plateau with an average altitude of 2,000 feet comprising three different types of country. Of these, Khandesh is akin to the plains of the Central Provinces and contains rich fields of black cotton soil growing excellent cotton and wheat. It is a richer tract than the rest of the Deccan. The western hills are covered with jungle, in which small hamlets are established wherever the soil is cultivable. To the east of these lies the main plateau traversed by the streams that eventually find their way to the Godavari and the Kistna. The soil is generally shallow but contains rich alluvial pockets. The rainfall is uncertain, and this area is constantly liable to drought and famine.

The Karnatak lies to the south of the Deccan at about the same altitude and contains a trap area which passes into a transition tract between the trap rocks to the north and the metamorphic rocks to the

south. This transition tract is rich and contains some of the deepest and most retentive black soils in the presidency.

The Konkan lies between the coast and the Western Ghats and consists of narrow elongated strips, hilly and difficult to traverse. The soil is usually shallow and poor and except on the coast there is little level land. In the valleys there are rice-fields, gardens, and mango orchards.

There is one feature which is common to the larger part of the presidency. Most of the soils are derived from the disintegration and decomposition of the Deccan trap, though granite and gneiss appear in the extreme north.

The rain falls mainly between the months of June and October, but some parts receive later rain in November and December. The south-west monsoon strikes the west coast and works its way north towards Gujarat. As it advances, the amount of precipitation decreases along the coast. While the extreme south receives as much as 150 inches, places 200 miles to the north receive only 100. The monsoon travelling inland is arrested by the higher range of the Western Ghats where the precipitation reaches 200 inches. A very few miles eastwards there is a rapid decrease in the fall. On the basis of rainfall, the presidency, therefore, can be divided into the following tracts: (1) the Konkan districts and a narrow strip of 15 to 20 miles on the crest of the Western Ghats, which receive more than 80 inches and where the rainfall is both heavy and dependable; (2) a strip of 15 to 20 miles to the east of the above strip, in the Deccan and the Karnatak, which receives from 35 to 50 inches of rain but in which the fall and its proper distribution is by no means certain; (3) further to the east is a tract which, in good years, receives from 18 to 30 inches but which frequently falls below this and is consequently liable to famine; (4) Khandesh which receives from 20 to 30 inches, but where the rainfall is normally secure; and (5) Gujarat, which receives from 20 to 40 inches on an average, the amount tending to become smaller towards the north.

Gujarat has a brisk cold season and a hot oppressive summer. In the coastal tract, the temperature is equable but inland it ranges between 52° in the cold weather and 110° in the hot weather.

In the Konkan tract, the air is heavily charged with moisture throughout the year and the climate, except from December to February, is oppressive, though the thermometer seldom rises above 96°. Extremes are unknown as the climate is always tempered by sea breezes.

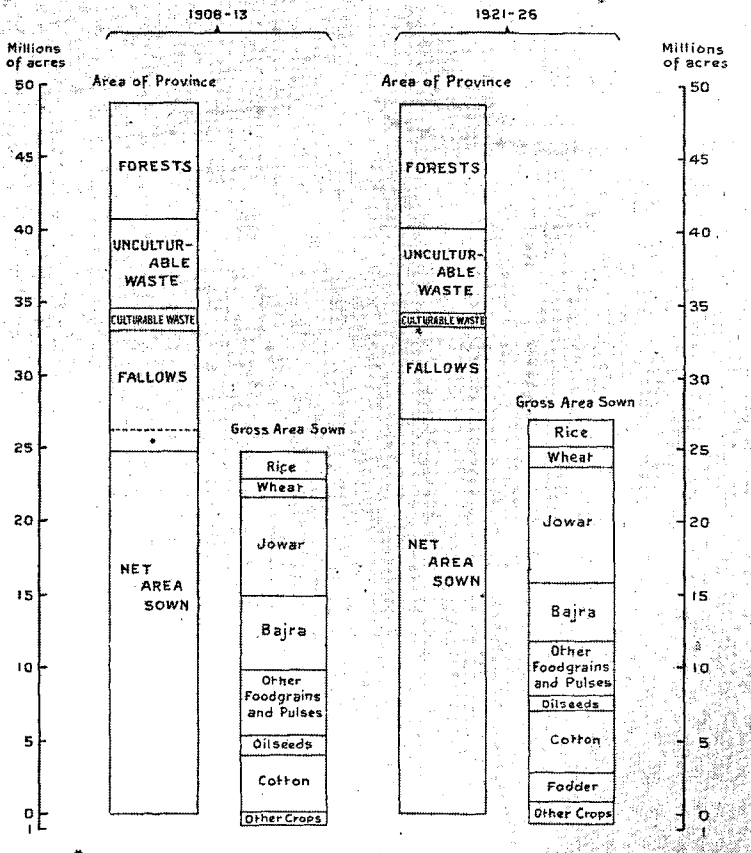
In the Deccan, during March and April, the thermometer reads from 100° to 110° but the air is dry and the heat less oppressive than on the coast. During the monsoon the climate is pleasant, and the cold months are bracing.

BOMBAY (PRESIDENCY PROPER)

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 Year averages)

NOTE:- *The difference between the Gross Area Sown and the Net Area Sown represents the area sown more than once.*



* *Approximate area of Fodder Crops included in Fallows. In 1915-16 areas under Grass and Babul previously shown as Fallow were included in the Area Sown under Fodder Crops; the area so treated in 1915-16 was about 1½ million acres. The corresponding area for the years 1908-09 to 1912-13 is not known, but it has been assumed that it was about 1½ million acres. Fodder Crops other than Grass and Babul averaging about 47,000 acres for the period 1908-13 are shown under other Crops.*

To face page 115

In the Karnatak, the cold season is short. During the hot season the climate is tempered by westerly breezes from the sea and extremes of heat, except in the east of the division, are seldom reached. In the whole of the presidency, outside Sind, frost is very rare though not quite unknown.

The total number of villages in the presidency proper is 22,841. The relative importance of the chief crops of the Bombay Presidency including Sind is shown by the accompanying diagram. The columns show, for the periods 1908-13 and 1921-26, the proportion of the whole area which is cultivated ; and they have been sub-divided into sections showing areas occupied by different crops.

The total cultivated area of the presidency proper is 33·5 million acres. Of this, the gross cropped area in 1926-27 was 28·5 millions, about half a million being cropped more than once. The uncultivated area, more than half of which is forests, is about 15·2 million acres. Of the cropped area, 19·5 million acres are under food crops and 8·5 millions under non-food crops. Amongst the former, *juar* 7·5 millions, *bajri* 4·5 millions, rice 2 millions, and wheat 1·3 millions are the most important. Sugarcane is grown on 66,000 acres. The most important non-food crop is cotton which is grown on 4·3 million acres. Oil-seeds account for 1·2 million acres.

A census of livestock is taken every five years. Recent figures for cattle are :

	Millions.
1909-10	7·5
1915-16	9
1919-20	8
1924-25	8·5

In the last census, there were over 3·3 million plough cattle, 2·8 million milch cattle and 2·8 million cattle for other purposes. The sharp fall in the number of cattle in 1919-20 was the result of the serious drought in 1918-19 and 1919-20. The rapidity of recovery in favourable seasons is shown by the figures of 1915-16 and 1924-25. There are at present 11 plough cattle and 9 milch cattle for every 100 acres cropped. The number of sheep and goats in 1924-25 was 1·8 millions and 2·8 millions respectively, while there were 126,000 horses in the presidency.

2. PROVINCIAL INCOME AND EXPENDITURE.

The development of agriculture and other rural activities being closely connected with the question of provincial finance, a Table is appended showing the provincial income and expenditure during each of the last five years.

(Figures are in

Revenue and Expenditure charged to Revenue

Receipt heads	1922-23	1923-24	1924-25	1925-26	1926-27	Expenditure heads	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						*Expenditure charged to Revenue*					
Principal Heads of Revenue—						Direct Demands on the Revenue—					
Land Revenue ..	559	509	517	541	467	Land Revenue ..	167	183	63	65	66
Excise	423	435	443	415	409	Forests	40	44	44	44	43
Stamps	176	180	178	176	168	Other heads ..	44	47	49	63	73
Forests	70	71	73	75	77	Capital outlay on Forests charged to Revenue	..	..	..	..	2
Registration ..	13	13	12	13	12	Irrigation—Revenue Account	73	71	92	95	85½
Other heads ..	6	9	9	16	19	Irrigation—Capital Account charged to Revenue ..	..	30	..	..	10
Irrigation	53	54	53	42	49						
Interest on debt ..	80	103	133	166	168	Debt Services ..	109	155	202	277	250
Civil Administration—						Civil Administration—General Administration.	117	103	223½	231	228
Administration of Justice	14	15	15	16	18	Administration of Justice ..	67	70	73	75	76
Jails and Convict Settlements ..	5	5	5	5	6	Jails and Convict Settlements ..	27	25	26	26	25
Police	8	6	5	8	8	Police	174	168	171	172	170
Education ..	10	10	11	11	11	Education ..	172	193	186	198	201
Medical	6	6	6	6	5	Medical	45	44	45	49	52
Public Health ..	5	8	6	6	6	Public Health ..	18	20	23	25	22
Agriculture (including Veterinary and Co-operation) ..	4	4	3	3	3	Agriculture (including Veterinary and Co-operation) ..	24	24	27	27	27
Other departments ..	1	2	2	3	2	Industries ..	3	2	..	1	1
Civil Works ..	16	18	15	16	16	Other departments ..	8	9	6	5	5
Miscellaneous ..	24	33	28	30	35	Civil Works ..	106	100½	95	96	126
Miscellaneous adjustments between Central and Provincial Governments (net) ..	..	28	41	10	4	Miscellaneous ..	159	136	147	166	161
Extraordinary receipts ..	..	..	..	..	3	Contributions to the Central Government ..	56	56	56	34	28
Total, Revenue Receipts.	1473	1509	1555	1558	1486	Total, Expenditure charged to Revenue ..	1409	1479½	1528½	1649	1651½

OF BOMBAY

lakhs of rupees)

Capital Receipts and Expenditure

Receipt heads	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Receipts					
Revenue Surplus ..	64	29½	26½	..	..
Bombay Development Scheme ..	28	28½	24	28	25½
Loans from Central Government ..	765	1025	704½	..	..
Famine Insurance Fund.	61	33	50	51	47
Sinking Funds ..	10	11	11	12	12½
Loans and Advances by Provincial Government	96	63	37	87	83
Advances from Provincial Loans Fund ..	..	..	..	658	262
Other Capital Receipts ..	..	..	4	9	7½
Total, Capital Receipts ..	1024	1190	857	845	437½
Opening Balance ..	214	434	582	668	734

Expenditure heads	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Expenditure					
Revenue Deficit ..	..	..	..	91	165½
Capital outlay on Forests	2	4	1	..	..
Construction of Irrigation, etc., works ..	69½	70	156	246	207
Capital outlay on improvement of Public Health	6	1	..	12	8
Capital outlay on Agricultural Improvements	..	1	..	..	..
Bombay Development Scheme	265½	248	158	77	45
Civil Works ..	45	66	85	78	37
Other Works not charged to Revenue ..	18	2	1	..	10
Payment of commuted value of Pensions ..	..	..	..	..	4
Loans from Central Government (repaid) ..	29	29	29	..	..
Sinking Funds ..	10	11	11	12	7½
Loans and Advances by Provincial Government	359	610	330	188	93
Advances from Provincial Loans Fund (repaid)	..	..	..	75	70½
Total, Capital Expenditure	804	1042	771	779	647½
Closing Balance ..	434	582	668	734	524

The finances of the presidency are not in a prosperous condition. A considerable effort at retrenchment was made in 1922, but owing to the expansion of various activities, an increase in expenditure became inevitable, and was met by increased taxation. Since 1922, Government has increased its famine fund from practically *nil* to nearly Rs. 2 crores

and its balances from Rs. 2 crores to about Rs. 3·5 crores. The expenditure in 1926-27 shows an increase of 123 lakhs over the actuals of 1924-25. This figure indicates the expansion of the demands of the administrative departments, especially on the transferred side of Government.

On the income side, land revenue is responsible for 34 per cent, excise comes next with 28 per cent, followed by stamps 12 per cent. Forests bring in a revenue of about 5 per cent, while the other sources of income contribute only 21 per cent. The land revenue system is described in another section. Any increase under this head can only follow increases sanctioned at revision settlements. There has been a strong opposition in the Legislative Council in recent years to any increase, in spite of an appreciable rise in prices. In the case of excise, the increase in revenue has been due not to any increase in consumption—which on the contrary has fallen very greatly—but to an increase in taxation. The policy of the Government has been to reduce consumption, first by increasing the cost to the consumer, and secondly by rationing. The latter course will bring about a considerable reduction in the revenue under this head.

The new taxes levied during the last few years were a tax on entertainments and a totalisator tax. Stamp duties and court fees have also been increased.

On the expenditure side, next to debt services and general administration, education comes first and expenditure on it has risen to over Rs. 2 crores or twelve per cent of the total expenditure. The amounts spent on agriculture, public health and medical are two per cent, one-and-a-half per cent and three per cent, respectively.

3. REVENUE ADMINISTRATION AND LAND RECORDS.

The Governor is assisted by four Members of the Executive Council who deal with law and order, finance, irrigation, land revenue and famine relief: and by three Ministers who deal with agriculture, co-operation, veterinary services, local self-government, public health, education, excise and forests.

The revenue administration of the presidency is carried on by four Commissioners, under whom are Collectors, one for each district. One Commissioner is in charge of Sind, the other three are in charge of the Northern, Central and Southern divisions. The collectorate generally comprises ten talukas each consisting of 100 to 200 villages. The village in some respects still retains traces of the old system of village government by the rural community. Each village has its regular complement of officers, some of whom are hereditary. The principal village officer is the *patel* who is the headman of the village for revenue and police purposes. The *kulkarni* or *talati* is the village accountant, the *mahar* is the messenger and there is also the watchman. The *patel* and *kulkarni* usually hold a certain area of land rent-free and are in addition

remunerated by cash payment. The *mahar* and the watchman also hold land on favourable terms and receive, in addition, grain and other payments in kind from the villagers. The village is for government and for social purposes generally self-contained. Each taluka is in charge of an officer called the *mamlatdar*. He looks after the revenue administration of the taluka and treasury and is ordinarily also a magistrate. Over the *mamlatdar* comes the assistant or the deputy collector with a subdivision consisting of three or four talukas. For seven months in the year he is on tour to inspect the revenue work and ascertain the needs of the villagers. The Collector is the revenue head of the district and also the district magistrate. The Revenue Commissioner exercises general superintendence and control over the revenue administration of a division of six or seven districts. It is his duty to advise Government on the major problems of administration and on the qualifications of officials under him.

The land revenue system of the presidency is known as *ryotwari*. Every plot of land is held from Government in perpetuity as a transferable heritable property on condition that the holder pays land revenue to Government as fixed at the settlement. The settlement is in force for a period of thirty years. At the conclusion of the period of settlement, the revenue payable is liable to revision, within certain fixed limits. An increase in the assessment is based on an increase in prices and is supported by such considerations as improvement in communications, increase in rents and prices of land. The enhancement, however, in the case of a whole taluka cannot exceed 33⅓ per cent over the previous setlement rate nor can it exceed 100 per cent in the case of an individual holding. Recently it has been decided to reduce the general limit to 25 per cent in the case of all talukas that have already undergone a second revision. Any improvement of land made by the landholder either at his own cost or from money borrowed from the Government is exempt from enhanced assessment.

The preparation of original survey settlements began in 1835 and continued till 1901. The principles of the existing system were evolved some eighty years ago by Messrs. Wingate and Goldsmid. Each piece of land was measured and classified and its relative productive capacity was assessed with accuracy. The comparative valuations of the fertility of soils were expressed as parts of a rupee, sixteen annas representing a perfect field, from which deductions were made for disadvantages such as slope, excess of lime or moisture, inferiority in character or depth of the soil. After the relative valuation in fertility of the soil of every field had been completed, the villages were divided into groups, each consisting of villages judged to have equal climatic and economic advantages. Then the rate of assessment of the 16 anna land in each group was determined as the maximum rate; and all other

land was assessed on a comparative basis, the rates fixed to be paid annually after harvest or in two instalments.

Two important improvements which have been introduced in recent years in the revenue system are the record of rights, and rules for the suspension and remission of land revenue. The record of rights was prepared from 1904 onwards. It is based on possession and shows in detail all rights in each piece of land. It also shows the tenure of the land and all encumbrances thereon. When crops fall below a certain standard owing to drought or the failure of the water supply in irrigated land, provision is made by rules for the grant of suspensions or remissions of land revenue. The Collector ascertains by local enquiries that there has been a partial or total failure of crops and suspends the collection of land revenue accordingly.

4. THE CULTIVATOR.

Out of the total population of 16 millions in the presidency proper in 1921, 7·7 millions were landholders and tenants, 2·3 millions agricultural labourers, while the non-agricultural population was about 6 millions. Compared with 1911 this shows an increase in the rural population of Gujarat and Khandesh, a decline in other parts of the presidency, and a diminution in the number of agricultural labourers generally who declined from about 3 millions in 1911 to 2·3 millions in 1921, a decline partly due to migration to urban areas, and partly to transfer to the rank of landholder.

As regards the cultivators in the different parts of the presidency, there are great differences in economic condition and mental and moral development. There is the cultivator of Gujarat who is as efficient as any in the world and the hard-working and patient cultivator of the Deccan; and there is the backward and lazy member of the wild hill tribes who has recently turned agriculturist and secures only the minimum outturn from his land. The people mostly live in villages containing from 100 to 1,000 houses. It is only in the Konkan that cultivators have homesteads on their own lands. The village site is usually provided with a *chavdi* where the village officers hold their office, and which is also a common meeting place of the inhabitants. The water supply in villages not situated on a river comes usually from a common well, or, in some places, from the village tank. As regards sanitation, while the people are personally clean, there is no communal effort and the surroundings of their houses are often dirty. Their diet, except in the rice growing tract, consists mainly of *juar* or *bajri*. Wheat is consumed only by the more prosperous classes, while in the hill tracts inferior millets are the staple food.

The province being almost entirely *ryotwari*, the average holding is small and often there is a dense population on the land. The following Table shows the size and distribution of holdings in each

division, together with the land assessment for the holdings per acre in 1922-23 :

Details	Gujarat	Deccan	Karnatak	Konkan	Total, Presidency Proper
	No.	No.	No.	No.	No.
Number of holdings—					
1. Under and up to 5 acres ..	273,683	358,754	150,905	195,344	978,686
2. Over 5 and up to 25 acres ..	124,654	423,932	199,623	61,429	809,638
3. 25 to 100 acres ..	18,224	140,880	50,918	14,363	224,385
4. 100 to 500 acres ..	1,544	12,905	4,927	2,465	21,841
5. Over 500 acres ..	130	435	195	141	901
Total ..	418,235	936,906	406,568	273,742	2,035,451
Total area in acres ..	3,063,825	14,828,255	6,350,176	2,293,174	28,535,401
Average—					
Area of holding in acres ..	7·3	15·8	15·6	8·3	14·0
Assessment per holding Rs.	16 6 9	13 12 5	12 0 1	12 8 6	13 14 1
Assessment per acre Rs.	2 3 10	0 13 11	0 12 0	1 9 10	0 15 11

These figures show how small are the holdings, but it is impossible to compare one district with another as the land varies so much in fertility that a small holding in Gujarat may be equal to a much larger one in Konkan or the Deccan. In the presidency proper, there are only 22,742 holdings of more than 100 acres, or a proportion of 1·1 per cent of the whole. The units of cultivation may be far smaller, being often scattered in different parts of a village. The fragmentation thus caused acts as a severe handicap to proper cultivation, as in the Konkan, for instance, where there are fragments of less than 1/40th of an acre and even as low as 1/160th of an acre. So far, very few attempts at voluntary consolidation have been made as the work presents special difficulties, especially in areas where the quality and depth of soil vary greatly.

An attempt is being made to tackle the problem by means of legislation and a Bill has recently been introduced in the Bombay Legislative Council for the purpose.

The greater part of the Bombay Presidency bears one crop, *kharif* or *rabi*, the first from June to November, the second from September to March. During the remaining months the inhabitants of the villages, except in the irrigated tracts, have a considerable amount of spare time. During this time, carting is done, and some home industries such as spinning and weaving are carried on ; in some places, there are small local industries such as sugar making from palms, cane preparation, lacquer work and rope making. Muhammadans and the depressed classes keep poultry but caste Hindus regard fowls as unclean animals. Cattle breeding is common in all parts of the province ; and sheep and goats are the care of special castes. These occupations, however, do not occupy the whole leisure time available, nor do they supply an adequate income.

The position of labourers has improved considerably in recent years. The standard of living is reported to have risen in all parts of the presidency and to be higher now than at any previous date. The daily

wages of field labourers in rural areas increased from As. 2-3 in 1900 to As. 4 in 1913 and to As. 7-6 in 1927. In the case of other labourers, the corresponding figures are As. 2-6, As. 4-6 and As. 10-3. In urban areas similar wages have risen from As. 3-6 in 1900 to As. 5-9 in 1913 and to As. 10-3 in 1927. Compared with a decade ago, the working day in agriculture has been shortened. The hours now are from 7 a.m. to 11-30 a.m. and from 2 p.m. to 5-30 p.m. For casual labour the number of hours are 9½ to 10. The direct influence of industrial centres, such as Bombay, on rural areas has been to shorten hours and to tempt the labourer away from rural employment. The chief industrial cities are Bombay, Ahmedabad and Sholapur and in these cities the cotton mills alone employ a force of 230,000 mill hands. The indirect effect has been through the concentration of capital in the towns and the loss of it to the country-side. Industrial concerns, banks, etc., have provided an alternative investment to land and moneylending. Commercial activities connected with the flourishing export and import trade of Bombay city similarly engage surplus capital and employ labour on a large scale.

Much employment has been provided in recent years by the State in the extension and duplication of railways, and the extension and improvement of roads, and by municipal bodies in town planning schemes.

Special mention should be made of the Marathas of the Deccan and Konkan. They number three millions, and retain the martial qualities which were famous on land and sea in the seventeenth and eighteenth centuries. They maintained that reputation in the great war.

The cultivator may be said to be as conservative as in other parts of the world. He cannot afford to take risks, but, when satisfied of the value of a new crop or implement, he does not hesitate to adopt it, as may be seen from the spread of groundnut and the introduction of the iron plough. The burden of debt lies heavy upon him; much of it has been incurred for unproductive purposes, such as marriages, funerals and pilgrimages. There is ground for hope that co-operative societies may lead to the redemption of debt and to the discouragement of unproductive borrowing.

5. THE AGRICULTURAL DEPARTMENT.

In 1802, the Government of Bombay imported cotton seed "reputed to be of a superior description" for cultivation in territories then held by Maratha Rulers. In 1830, the Agri-Horticultural Society of Western India was formed at Poona. In 1878, classes for agricultural education were started in the Poona Civil Engineering College. The Department of Agriculture was established in 1883. At first, the duties of the department were mainly statistical; to compile and maintain an analytical study of each district in order to ascertain its need for protection against famine; also to prepare agricultural statistics and maintain a record which was likely to be useful for revenue settlements. Experimental work was undertaken at farms started in Khandesh, Sind, Gujarat and Poona. An experimental farm was also attached in 1888 to the

Poona Engineering College. When the late Dr. Mollison joined the service in 1890, the operations of the department expanded with the opening of farms at Surat and at Manjri and a cattle breeding farm in north Gujarat for the preservation and improvement of the Kankrej breed of cattle.

In 1904, the Department of Land Records was separated from the Department of Agriculture and the Director was enabled to devote more time to the direction of research, propaganda, and demonstration. In 1907, came the establishment of the Agricultural College as a separate college in Poona. The college had then a staff consisting of a professor of agriculture, an economic botanist and an agricultural chemist. These officers were also in charge of research work and experiments. There has been a steady expansion of the department in the last twenty years. In 1907-08 its budget was Rs. 4·5 lakhs, in 1915-16 it rose to Rs. 8·5 lakhs, and is now about 17 lakhs. The principal officers at present are: the Director, six deputy directors of agriculture, one for each division, an economic botanist, agricultural chemist, professor of agriculture, horticulturist, plant pathologist, agricultural engineer, livestock expert, and soil physicist. A recent addition has been that of a professor of agricultural economics.

The work of the department may be considered under the heads of—

(*a*) Research and investigation.
(*b*) Demonstration and propaganda.
(*c*) Agricultural education.
(*d*) Cattle breeding and dairying.
(*e*) Agricultural statistics.

(*a*) *Research and Investigation.*

The progress made in the matter of research is to be measured both by the results achieved and by the improvement in the methods used. The latter have become more scientific, and purely empirical experiment is falling more into the background. The organisation of the work has also been transformed in recent years. Research work in recent years has been along the line of giving the worker as much liberty as possible under the control of a committee which is usually under the chairmanship of the Director of Agriculture, and is composed of men who have special knowledge of the work in hand. The men recruited for research work are usually chosen from the graduates of the Poona Agricultural College and are at first placed under a competent research officer to gain experience.

The most important research work done is that on cotton. Hybridisation has produced several new and improved types on the farms, and the seed has been distributed over large areas. The introduction of the new type 1027A in southern Gujarat has been estimated by a commercial authority to have added not less than Rs. 30 lakhs annually to the value of the crop in the tract. Good results have also followed from selection of such varieties as Dharwar No. 1, and Gadag No. 1 in the Southern Maratha country. In Khandesh, a high yielding type (N. R.) has been popularised and now covers very large areas. So also new varieties of

groundnut, the Japanese and Spanish pea-nut, have been widely introduced. Between 1912-13 and 1926-27, the area under this crop in Khandesh and in Gujarat has increased from about 5,000 to nearly 312,000 acres. This crop which is worth Rs. 80 to Rs. 100 per acre has replaced millets which only fetch half that sum. As regards wheat, Pusa varieties have been introduced in some of the districts of Gujarat. A new variety of rice has been distributed very recently and gives an increased yield of nearly twenty per cent. Some good work has also been done on tobacco and sugarcane.

Further research is in progress on the evolution of new types of cotton and on the improvement of existing types, on the study of cotton wilt, on the improvement of potato and *bajri* crops and of grass-lands. It is hoped that the pure types of rice and *juar* now being distributed will yield fifteen to twenty per cent more grain than was obtained before.

Success has also been achieved in the introduction of certain kinds of improved implements and in checking some plant pests. The iron plough and iron sugar mills are now widely adopted in the Deccan. The enterprise of Messrs. Kirloskar Brothers, who have established in Satara a very valuable pioneer factory for the manufacture of implements, has greatly assisted the spread of the iron plough and the sugar mills in the Deccan. In regard to plant diseases, mention may be made of the increasing use of copper sulphate as a preventive of smut in *juar* and of Bordeaux mixture for grapes and betelnut. Reference may also be made to the use of concentrated manures for garden crops and of castor cake for cotton. In Gujarat, ridge cultivation has been introduced for cotton and *juar* and has consistently given an improvement of twenty to twenty-five per cent in yield.

Investigations are also being carried out on methods of tillage. Dry cultivation, particularly in the tracts in the Deccan which are liable to drought, is one of the most important problems for the department. The soil experts are seeking to find methods for the preservation of soil moisture, and experiments in green manuring are in progress. Work is also being done on the discovery and development of suitable fruit crops. The work of the department has been assisted by a grant from the Indian Central Cotton Committee who have provided Rs. 65,000 a year for five years, for the investigation of the cotton boll worm in Gujarat and for wilt diseases of cotton. In 1911, in commemoration of the visit of His Majesty the King Emperor to India, a private donor, the late Sir Sassoon David, established a trust with an endowment of £53,400 (Rs. 8,01,000) the interest on which is to be used chiefly in giving grants-in-aid of expenditure incurred in establishing vernacular agricultural schools, or in conducting experiments for the introduction of improved methods of agriculture or the devising of improved agricultural machinery.

There are now seventeen experimental and seed stations of which five are in Gujarat, two in Khandesh, five in the Deccan, two in the Karnatak and three in the Konkan.

(b) Demonstration and Propaganda.

In recent years, the Agricultural Department has been working in close touch with the Co-operative Department, with private individuals in many districts and with taluka development associations subsidised by Government. The staff employed on this work consists in each division of a deputy director of agriculture supervising district agricultural overseers of whom there are usually two to each district. A divisional board of agriculture has recently been created for each division. This is presided over by the deputy director of agriculture or the assistant registrar of co-operative societies, and has secured the services of non-official gentlemen interested in rural development. They advise the Director of Agriculture and the Registrar of Co-operative Societies on the application of the agricultural and co-operative policy and they control the propaganda work in their division. They distribute government grants for loans to agricultural societies and the discretionary grant for propaganda purposes. The number of these divisional boards is now six. The taluka development associations are a recent creation and date from 1922. They receive a subsidy from Government equal to the amount which they collect, subject to a maximum of Rs. 1,000 per annum; and some of them are reported to be making substantial progress. The close touch which has been established between the Agricultural and the Co-operative departments has resulted in the successful organisation of several co-operative societies for the purchase of agricultural requisites and for the sale of agricultural produce. In some areas arrangements have been made for the supply of implements on hire. Methods of co-operative sale have also been effective in the case of cotton and *gur*: and one taluka development association is reported to have made progress in introducing co-operative fodder storage. Seed farms for the distribution of improved seed have been established by the department itself. The uncertainty of finding water, when wells are sunk, has been a very serious difficulty for the cultivator and has caused the loss of considerable sums of money so invested. For several years the department has undertaken boring operations to ascertain the presence of supplies of water and also to deepen existing wells; and recently experiments have been made, with considerable success, with water-divining. The terracing of lands and the leading of hill streams on to these terraces is a special feature of cultivation in the Deccan and presents engineering problems of some complexity. A special staff has recently been engaged by Government to assist cultivators with the expert knowledge necessary to deal with these problems.

"Generally speaking," says the Director in his last report, "we can look round the presidency and see in most areas improvements worked out or introduced by the Agricultural Department in large scale use; a gradually increasing desire among the cultivators for fresh development and a very strong movement towards the organisation of local agricultural development by the people themselves in many areas."

(c) *Agricultural Education.*

Higher agricultural education was introduced in 1878 after a severe famine which attracted attention to the necessity of the improvement of agricultural methods and practice. A course was started at the Poona Civil Engineering College specially designed for men who were to occupy the position of revenue inspectors. The course was for two years and attracted the attendance of thirty students. But the class declined in numbers when the students found that this course was not a direct road to government employment. In 1880, a farm was started and practical instruction given. In 1885, the University of Bombay was moved to grant a degree in agriculture, but it was not till 1890 that the university decided to give a diploma. The men trained received no preferential treatment, except for appointments to minor posts. This was not encouraging, and numbers again declined, and no student obtained a diploma in agriculture between the years 1897 and 1901. In 1897, the standard of admission to the course was raised and Government agreed to recognise an agricultural diploma as equal to a degree of the university. In 1899, the university consented to establish a regular course leading to a degree in agriculture. The number of students gradually increased; in 1907, 11 received degrees and in 1925, 59. In 1907, a separate agricultural college was established. The course of study was laid down by the university, and under Dr. Mann the college attained a considerable reputation, and attracted students from countries so far distant as Burma, Ceylon and Persia.

The department maintains six vernacular agricultural schools, of which that at Loni, near Poona, was the first. These schools are definitely vocational and are meant for the sons of cultivators possessing not less than 30 acres of dry or 10 to 12 acres of irrigated land. Boys are admitted between the ages of 14 and 17 provided that their aim is to go back to private farming and not to take service. They are required to do a considerable amount of practical work on the fields. Education, board and lodging are free. Each boy costs Government about Rs. 260 per year, or Rs. 520 for the full course of two years.

In 1922, a new course was introduced on the Punjab model for agricultural education in the higher standards of primary vernacular schools, and provision was made for teaching both theoretical and practical agriculture, with instruction in village carpentry and iron work in addition to the ordinary school routine. Each class is in charge of a teacher who has received a year's special training at a training school maintained by the Agricultural Department. Forty-three such classes have now been opened and have proved successful.

There is a short practical one-year course in agriculture at the Poona Agricultural College which is attended every year by about twelve to twenty young men belonging to the land-owning classes. There are also short courses on some of the government farms, the most successful is one in sugarcane-growing at the Manjri farm. This class which is very popular lasts for three weeks.

(d) Cattle breeding and Dairying.

Bombay has many breeds of cattle, each suited to its own region, of which the following eight have distinctive characteristics :—

Kankreji in Gujarat,
Malvi in Khandesh,
Krishna Valley in Belgaum,
Amrit Mahal in Dharwar,
Gir in Kathiawar,
Dongri in Thana and Nasik,
Khillari in the Deccan,
In Sind { Thar and Parkar for draught, and
Karachi for milk.

In general, however, it may be said that the cattle are of mixed breed, poor milkers, and mature very late. Attempts at improvement have been made by Government since 1881 when bulls were distributed to each district in charge of the district local boards. In 1907 the Civil Veterinary Department distributed premium bulls to individual landholders. This system has proved useful. There are now 63 bulls so kept with a subsidy from Government, and the demand is rapidly increasing. Owing to the difficulty of finding good bulls, Government established farms for different breeds to produce their own bulls. These breeding farms were established for the Kankreji cattle at Chharodi and Surat, for Amrit Mahal cattle at Bankapur and for Sindhi cattle at Karachi. Government are also subsidising two *gowshalas* to produce pedigree Gir cattle. Some other *gowshalas* have also been recognised and are being conducted under Government advice. Some half a dozen cattle shows are held every year.

The chief difficulty in the improvement of cattle consists in the absence of castration as a general practice. The village herds wander on communal pastures and good cows are spoilt by wholly unfit bulls. The sanctity of the animal prevents the elimination of the unfit and large numbers are preserved which are of no economic value.

Attempts have been made to establish a dairying industry in the Kaira district of Gujarat. Butter and cream are transmitted to Bombay, a distance of 300 miles, but the industry has not yet proved a success on a large scale.

(e) Agricultural Statistics

These fall under three heads :—

(1) land and its assessment,
(2) agricultural resources, and
(3) crops and tenancies.

The first is mainly fiscal. The second includes information for the quinquennial census of cattle and resources, and of the sources of water supply.

The third consists of the record of crops and tenancies, the abstract and forecasts of various crops, fortnightly statements of prices of principal agricultural products and weekly season reports. Most of the statistics are prepared in the first instance by village officers and then

checked by superior officers. They are fairly accurate for practical purposes.

6. THE VETERINARY DEPARTMENT.

In 1909, the Civil Veterinary Department, as at present constituted, was established. Before that date veterinary work dealt principally with horse breeding and was in charge of officers lent from the Military Veterinary Department. Horse breeding was then transferred to the Military Department and the Civil Department concentrated its operations on cattle. Veterinary hospitals and dispensaries are in charge of the district local boards, Government contribute towards their maintenance and bear the cost on account of the veterinary assistant surgeons in charge of them. Cattle breeding is now in charge of the Agricultural Department and under the control of their livestock expert, and the Veterinary Department confines itself to dealing with cattle diseases.

There are 103 veterinary dispensaries in the presidency proper, and some districts, in which the local boards are affluent, such as East and West Khandesh, will shortly have one dispensary in each taluka. Poorer districts, such as those on the coast, have on the average only three dispensaries to a district. Progress in the matter of construction of new dispensaries has been accelerated since 1910 when the Trustees of the estate of the late Mr. N. M. Wadia, C.I.E., offered to place at the disposal of Government Rs. 15,000 a year for the construction of such buildings. Eighteen veterinary dispensaries have so far been built with the help of this donation, half the cost of construction being met from it and the remaining half from provincial and district local boards funds. So far, it appears that the dispensaries have not been largely resorted to by the rural population and have chiefly benefited the people living in towns and surrounding villages. Touring dispensaries are being started in certain districts.

The Glanders and Farcy Act is at present the only Act for the control of diseases of livestock. In regard to rinderpest, preventive inoculation has been fairly successful. But there are difficulties in securing timely reports and there are prejudices against inoculation. These are gradually being overcome. Proposals for legislation for isolation of animals, for restriction of their movement and for compulsory inoculation are now before Government. In 1926-27, it is reported that 360 villages were affected with rinderpest, 15,189 cases and 7,002 deaths being registered.

A veterinary college was established in Bombay in 1886 primarily to train men for employment by Government or local bodies. There are about ninety-one students on the rolls, and the course lasts for three years. Of the sixteen candidates who passed last year, nine entered government service, and seven obtained employment in Indian States.

The department consists now of two officers of the Indian Veterinary Service and seven of the Provincial Veterinary Service, and the expenditure is a little over Rs. 5 lakhs.

7. IRRIGATION.

Out of the total cropped area of 27·5 million acres, less than a million acres are irrigated ; and of this irrigated area nearly two-thirds is in the

Deccan. The sources of irrigation are : (1) government canals irrigating 260,000 acres, (2) wells irrigating 500,000 acres, and (3) other sources, such as tanks and hill streams irrigating 200,000 acres.

Out of the total area of 260,000 acres irrigated from government canals, 230,000 are in the Deccan chiefly on works constructed for the protection of the country from famine. In the year 1874-75, the first attempt at the storage of the heavy monsoon rains was made and Lake Fife close to Poona was constructed to feed the Mutha canals. In 1884, the Nira Left Bank canals were constructed. After the report of the Irrigation Commission of 1903, a systematic survey was made, and several new projects were prepared and have since been carried out, such as the Godavari canals, the Pravara canals and the Nira Right Bank Canal. This last work is now nearing completion and the total then irrigated will exceed 400,000 acres. The economic conditions of the famine tract have been greatly improved thereby, and the people generally are not only more secure against famine but more prosperous in normal years. These works are important enough to deserve some detailed description.

(1) The Nira Left Bank Canal protects a part of the Poona district which receives precarious rainfall. Although designed as a protective work, it yields a net return of eight per cent on the irrigation of 83,000 acres.

(2) The Godavari canals irrigate a part of the Nasik district. They were completed in 1915-16 at a cost of a little over a crore of rupees. The area irrigated is 40,000 acres, of which 7,500 are under sugarcane. The villages in the canal tract are growing into busy towns.

(3) The Pravara canals were completed in 1926 at a cost of Rs. 1·5 crores. They irrigate 49,000 acres, of which 9,000 are under sugarcane.

(4) The Nira Right Bank Canal will be completed in 1931-32 and will irrigate 70,000 acres at a total cost of Rs. 4,91,00,000.

As the storage provided by the Lloyd Dam at Bhatgar for the Nira Right and Left Bank canals will not be sufficient for the full development of irrigation in the Nira Valley, a complete scheme which provides for the widening and remodelling of the Nira Left Bank Canal and for building a new dam at Vir to supplement the supply of the Bhatgar Dam has been sanctioned. The additional works will cost Rs. 135 lakhs.

The area irrigated from wells exceeds the area irrigated from government canals and other sources, and the cultivation thereon is of a very high order. The water is ordinarily drawn up by bullock power by means of big leather bags. In some places Persian wheels are found and oil engines are now being introduced, particularly in the Kaira district of Gujarat. In recent years there has been a lowering of the water level in wells, which has rendered the supply in some cases insufficient, and has everywhere increased the cost of irrigation.

Other natural sources of water supply have not yet been fully tapped. Opportunities are available for the construction of small tanks and masonry dams on hill-streams which might irrigate terrace cultivation and would supplement the supply from wells in the vicinity. Such works

already exist in the hilly tracts of the Deccan and in some parts of the Karnatak, and the scope for their extension is considerable. Government have recently appointed a special officer of the rank of superintending engineer to investigate the question of such minor irrigation works. This officer works under the Revenue Department and the work is financed from the famine fund. The results obtained have been encouraging.

The Irrigation Department also carries out some experimental and research work. Research problems are connected with waterlogging and salt efflorescence and the reclamation of such lands. Experiments are made in designing drainage channels to save land from waterlogging and in different methods of preventing leakage. Surveys have also been made with a view to distributing crops on soils best suited to them.

The importance of these canals to the cultivation of sugarcane may be appreciated from the fact that, in 1915-16, thirty per cent of the total area under sugarcane was irrigated by government canals but, in 1924-25, this area was sixty per cent of the total. This crop is also reciprocally valuable to the canals, for it pays a considerable proportion of their total revenue.

Mention may be also made here of three big hydro-electric works on the Western Ghats, established by the Tata Company. The power generated by these works is used almost entirely in urban areas for industrial and other purposes. There does not seem to be any immediate possibility of employing this power for the benefit of agriculture but the question of using the tail water of one of these works for purposes of irrigation is under consideration.

8. FORESTRY IN RELATION TO AGRICULTURE.

The area under forests is 15,000 square miles, or twelve per cent of the total area of the province. The distribution, however, is uneven: one district, Kanara, contains one-fifth of the total, Khandesh and Thana contain another one-fourth, while some of the districts in the Deccan and Gujarat have very small areas under forests. One-sixth of the area is in charge of the Revenue Department, the remainder being in that of the Forest Department. Large tracts are open for grazing and grass-cutting and are thus a valuable source for the supply of fodder. Complaints are sometimes heard about the closure of forests against grazing; but the area so closed seldom exceeds fifteen per cent of the total.

The Forest Department deals with all operations of technical forestry, but in matters concerning the rights and privileges of the people, the supply of grass, grazing, and fodder, the local revenue officers have a voice; and the Revenue Commissioner of the division exercises a general control.

The value of the Forest Department to the country is seldom fully recognised. While it has preserved forest growth for the use of future generations and has brought the forests under scientific regulation, it has eased the burden of the tax-payer by bringing in a net revenue of Rs. 30 to 40 lakhs.

The claims of agriculture have also been fully respected, and the cultivators in the neighbourhood of forests obtain their supplies of timber for

building, wood for agricultural implements, leaves for manure, fodder, grass, and grazing for cattle, at very low rates. The charge for grazing cattle in forests is a nominal fee of 2 to 4 annas per head per annum; and the total number of cattle admitted to graze in 1925-26 was about 2·5 million. In the principal forest district of Kanara, an experiment has been started of creating a minor forest department, to be in charge of forests which, though not growing valuable timber, are of special importance from the agricultural point of view. Experiments are also being made with a new system of closure of various areas for grazing so as to improve the quality and quantity of the grass; and some land has been handed over to the Agricultural Department to investigate the comparative effect of heavy or light grazing on the growth of grass.

Under the famine insurance scheme, forest grass has been stored in certain places, the reserves in Thana and the Panch Mahals amounting to 14,000 tons, and in West Khandesh to 8,000 tons. The grass is pressed and baled and is available for transport in times of scarcity to famine areas, the transport by rail being effected at special concession rates.

9. GENERAL EDUCATION.

In response to a growing popular demand due to the wider recognition of the need for the improvement and spread of education, the State and local bodies have enlarged the expenditure on the subject in recent years. As noted in section 2, State expenditure represents twelve per cent of the revenue. Between 1913-14 and 1926-27 the total expenditure on public instruction rose from Rs. 159 lakhs to Rs. 381·5 lakhs. Of this total, government funds contributed fifty-two per cent, municipal boards* eighteen and three-quarter per cent, fees seventeen and a quarter per cent, and other sources twelve per cent. Half the amount was spent on primary education. The State expenditure on education increased during this period from Rs. 73 lakhs to Rs. 198·6 lakhs.

The detailed figures of State expenditure for the year 1926-27 are given below :—

1926-27

Institutions

——	Boys	Girls	Total	Percentage
	Rs.	(Figures Rs.	in lakhs) Rs.	
University	12·7	..	12·7	6·35
Secondary	17·4	5·2	22·6	11·3
Primary	105·2	16·5	121·7	60·85
Special	10·6	1·9	12·5	6·25
Buildings	7·1	0·3	7·4	3·7
Miscellaneous, including scholarships.	7·2	1·1	8·3	4·15
Total ..	160·2	25·0	185·2	92·60
Direction and inspection ..	12·1	0·7	12·8	6·4
Exchange and expenditure in England	..	..	2·0	1·0
Grand Total ..	..	..	200·0	100·0

* Includes District Boards.

If we take the figures for the whole of India for 1924-25 the last year on record, we find that the expenditure per head for India was Rs. 21, while in Bombay it was Rs. 35. The percentage of scholars to population was 3·96 for India and 5·28 for Bombay. In the year 1926-27 the total number of pupils under instruction in Bombay was 1·15 million. The percentage of male scholars under instruction to the total male population was 9·12, the corresponding figure for girls being 2·43. The percentage of attendance varies very greatly according to the keenness for education in different communities. It is reported from the Deccan, for instance, that the Brahmin community send 100 per cent of their boys to school. The higher scale of expenditure in this presidency compared with the rest of India is in part due to the larger provision of trained teachers and to the higher salaries paid to them. Sixty per cent of the teachers had passed through a training institution; thirty-six per cent had passed a qualification standard; and less than four per cent were without qualification.

The primary schools are subject to the same criticism as elsewhere in India that they serve largely as a créche for infants. Out of the 9·3 lakhs of pupils, thirty-one per cent are in the infant class and only twelve per cent reach the fourth standard. Thus much of the money spent is wasted and is not effective in raising the standard of literacy. There is considerable popular support for the view that compulsion is necessary to secure the attendance of pupils until a stage when they may be regarded as literate. In 1923, Bombay passed a Primary Education Act under which compulsion could be introduced both in urban and in rural areas. This Act enabled municipal and district local boards to introduce compulsion. But so far, few of these bodies have taken advantage of this power. The areas in which it has been introduced are the following:—the municipal areas of Surat, Bandra, Dhulia, Byadgi, Satara, Ahmednagar, Sholapur and Broach. It has not yet been applied to any rural area.

The delay has been due partly to the need for a revision of the District Local Boards Act in which considerable changes were found necessary owing to the proposed transfer of the management of the primary schools to local bodies; the Act was revised in 1925 in the light of the Primary Education Act of 1923, and opportunity was also taken to broaden the basis of representation for the rural classes on the local bodies. Twenty-two out of the twenty-seven district local boards in the presidency have now taken over control of primary education.

On an average, there is one boys' primary school for an area of 10·3 square miles and the male population under instruction in primary schools is 6·8 per cent. Out of the total expenditure of 198½ lakhs on primary education, 62 per cent was found by Government, 28 per cent by local boards, 2·5 per cent by fees and about 7·5 per cent from other sources.

An attempt was made some years ago to separate the urban primary course from the rural. But this did not prove popular, since pupils taking the rural course were not able to pass into the English middle school; and

this distinction was therefore removed. An alternative syllabus for the vernacular final examination has now been introduced in order to adapt the education to the needs of the children of agriculturists. This experiment gives every promise of success.

Attempts have been made to introduce education for adults, and funds for this experiment were supplied by a private donor, the late Sir Vithaldas Thackersey. On the death of the donor, the experiment was discontinued.

To encourage education amongst the backward classes, a system of scholarships has been established, and in some cases special communal institutions have been founded. These backward classes number 3·7 millions and represent nineteen-and-a-half per cent of the total population; and the percentage of literacy amongst them is very small. The problem is, therefore, very urgent and is engaging the earnest consideration of Government.

In order to arouse public interest in rural areas on subjects connected with village welfare, such as education, agriculture, co-operation, and public health, magic lantern lectures have been recently instituted. These usually attract big crowds and have proved valuable in spreading useful information amongst a section of the populace which cannot be reached by printed matter.

10. CO-OPERATION.

The problems of providing finance for agricultural operations have been long examined and debated. The dependence of the cultivator on the village moneylender has led to much tyranny and oppression, and the cultivator has been handicapped by his illiteracy and his inability to understand accounts. In the 'seventies', this oppression led to agrarian riots and, in 1879, the Deccan Agriculturists' Relief Act was passed, which was subsequently extended to other parts of the presidency. This Act enabled the civil courts to examine the whole relation between a creditor and a debtor and to investigate the conditions in which the bonds were passed. The rapidly rising value of land was held to afford too facile credit to cultivators who were thereby encouraged to raise money for unproductive purposes without being able to understand the meaning of the engagements into which they entered. Attempts were, therefore, made to restrict their credit but with partial success in improving their condition. In 1883-84, all-India Acts were introduced to provide State loans of short-term credit for the purchase of seed and cattle and of long-term credit for the improvement of lands by the construction of wells and embankments. In 1904, the Co-operative Credit Societies Act was passed. This was restricted at first to the provision of credit. It was revised in 1912 so as to admit forms of co-operation other than credit and was replaced in 1925 by the Bombay Co-operative Societies Act. The Agricultural and Co-operative departments are concerned with the improvement of the economic condition of the ryot, and have worked together in close and intimate connection. Until 1920, the Registrar of

Co-operative Societies was subordinate to the Director of Agriculture, but since then he has held an independent post, and sits on a joint board with the Director of Agriculture.

From the first, the co-operative society enlisted the sympathy and help of private individuals with influence in rural areas, who, from a sense of public duty, help the department in the work of propaganda and organisation. The education of the agricultural classes in the co-operative idea and its economic and moral lessons was uphill work and made slow progress in the beginning. A great impetus to the credit movement was given by the establishment of the Bombay Central Co-operative Bank, now known as the Provincial Co-operative Bank. This was the first bank of the kind on the debentures of which Government guarantee the interest. This bank, like all other co-operative banks subsequently started, may lend money only to societies registered under the Co-operative Societies Act.

The progress made has been very rapid. The number of societies in 1910-11 was 256 with a membership of 20,000, the number in 1926-27 was 5,091 with a membership of 482,000. The working capital has also increased during these years from Rs. 14 lakhs to Rs. 10·3 crores. Of these societies, 4,286 societies are agricultural primary societies with a membership of 3 lakhs and a working capital of Rs. 3·8 crores.

The organisation in Bombay has a threefold division. There is first the government department under the Registrar which is responsible for the registration and cancellation of societies, their audit and liquidation, their general control in their relation to the State and their maintenance within the provisions of the law. In addition to the Registrar, the staff employed for this purpose consists of 7 assistant registrars, 44 auditors, and 10 organisers. The organisers are concerned mainly with the organisation and supervision of non-credit societies. The work of the auditors consists chiefly in auditing the accounts of the societies once a year. The general supervision is in the hands of the assistant registrars. The policy has always been to allow the societies to manage their own affairs and to reduce interference from outside to the minimum possible.

Secondly, there is a network of central banks with the Bombay Provincial Co-operative Bank at the head. This organisation deals with finance of societies. There is, thirdly, the Bombay Central Co-operative Institute with its branches, which undertakes propaganda, instruction and supervision on the moral and educative side. While the influence of the institute is growing, the Registrar and his staff also take their part in the work. The aim is to make the institute the central federal organisation of co-operative societies, representative of them and controlled by their delegates. Constitution of the institute has been revised and made more democratic. It has now a network of district branches. The institute holds conferences and training classes in English and in the vernaculars. The institute is helped both by the department and by the central financing agencies.

The most important unit in the organisation is the member of the individual primary society. The village co-operative credit society is formed on the basis of unlimited liability without shares. There is usually one society to a village. The capital of the society is raised by means of local deposits supplemented by loans from the district or from the Provincial Bank.

Credit still plays a chief part in the movement, but there has been some considerable development also on the non-credit side. The distribution of seed is mainly done through existing credit societies, and in some cases through sale societies. Societies for the hiring of machinery have been successfully started, dealing chiefly with ploughs and sugarcane crushers. Two power pump societies have been established to irrigate lands belonging to the members and two ginning societies have been registered, one of which has worked well for the last two years. Sale societies, dealing chiefly in cotton and *gur*, sold goods last year to the value of over Rs. 72 lakhs. In one case, opposition was encountered from local middlemen but was successfully overcome. Individual members of credit societies also made use of the Bombay Provincial Co-operative Bank for the sale of cotton and *gur*.

Another development has been the formation of fencing societies which construct walls to protect lands from the ravages of pigs and other animals. There are eleven such societies. It is anticipated in many cases that the protection thus afforded will pay for the cost of the walls in a year or two. There are eighteen societies for the breeding of cattle, fifteen of which are found in the Southern division where they are working well.

Much help has been derived from taluka development associations referred to in section 5. In all measures undertaken by private enterprise Government has afforded encouragement through the assistance given to the divisional boards, taluka associations, and a liberal grant to the Central Co-operative Institute. The central banks command the confidence of the public and are able to raise considerable sums.

A very important proposal which was recently before Government is the organisation of land mortgage banks. At present, long-term capital is supplied partly through the proceeds of debentures issued by the Provincial Bank and partly through the amounts placed at the disposal of the movement by Government out of its *taccavi* grant. If, however, the relief of indebtedness is to be undertaken on any appreciable scale, much larger amounts will be required. It is proposed that, in order to facilitate the formation of such banks, debentures should be issued and the interest thereon should be guaranteed by Government. It has been decided to start, as an experimental measure, two land mortgage banks, one in Gujarat and the other in the Karnatak.

11. COMMUNICATIONS AND MARKETING.

The presidency is served by three railways, namely the Great Indian Peninsula, the Bombay Baroda and Central India, and the Madras and Southern Mahratta. The first two are on the broad gauge and the last

is a metre gauge line. The Great Indian Peninsula connects Bombay with Calcutta and Madras, the Bombay Baroda and Central India with Delhi, while the Madras and the Southern Mahratta runs to Mysore. There are also branch lines in different parts of the presidency. The total milage of railways at present serving the presidency proper, excluding the States of Western India, is 2935. On the coast, communications are maintained by steamship lines which sail at regular intervals from Bombay to Karachi and the Persian Gulf in the north and to the ports of the Kolaba and Ratnagiri districts and on to Goa and Mangalore in the south.

The present milage of metalled roads is 8836. The principal roads in charge of the Public Works Department in the Central and Southern divisions are in very good condition. In Gujarat, partly owing to the fact that the country is interspersed with rivers and partly owing to the difficulty of getting metal, the condition of the roads is bad. Roads in charge of district local boards are not usually well maintained as the boards have not sufficient funds at their disposal.

In recent years, large sums have been expended on the provision of bridges and the improvement of low level crossings of rivers and streams. But off the main roads a great deal remains to be done in providing access to remote villages. The chief means of transport from the field to the market place or the railway station is the bullock cart. The motor bus has recently come in and is popular wherever the roads permit of its use. The motor lorry for transport is still in the future. The bullock cart has supplanted the pack animal which was the chief means of conveyance sixty years ago. Many types of cart are used, and some are capable of improvement both for the sake of the animals and to save the wear and tear of the roads. With better transport there will be encouragement for growing fruit and vegetables of a perishable character which cannot now be marketed quickly enough. In 1926, a Road Board consisting of officials and non-officials was appointed by Government. This Board is to advise Government on the classification of the roads and lay down standards to which each class of road is to conform. When funds are available for the construction of new roads, the Board will advise Government as to the allocation.

The greater part of the agricultural produce is dealt with in local centres for local consumption. Crops for export represent a small percentage of the total. The market of the export crops is highly organised, particularly in the case of cotton. Grading for sale on any large scale is unknown, except in the case of cotton and *gur*. In regard to cotton, government officers assist the grading done by cotton sale societies in the Karnatak and in regard to *gur* the Provincial Co-operative Bank supplies experienced valuers.

The small cultivator sells his produce either to the village *bania*, who is usually both a moneylender and a trader, or to an itinerant purchaser who comes to the village at harvest time ; or he may take his produce to the nearest market and sell it through an *adatya* (broker). The broker finds a purchaser for the produce and fixes the price for the cultivator.

The cultivator is generally at a disadvantage and is unable to dispute the price fixed for him by the broker.

In addition to the difficulty of communications, the cultivator is handicapped by the high rates of transport by rail and by the multiplicity of weights and measures which are sometimes manipulated to his disadvantage.

12. LOCAL SELF-GOVERNMENT.

The present system of local self-government dates from the year 1884 when an Act was passed to promote interest amongst the people in local matters and to give them a voice in the disposal of local funds. Under this Act, each district was to have a district local board and each taluka a taluka local board, the latter board being subordinate to the former. The proportion of elected to non-elected members was two-thirds and one-third respectively. By a recent Act, the constitution and powers of local boards have been revised, and the proportion of elected members has been increased to three-fourths. The franchise has been widened and women can now be elected members. Additional sanitary and other powers and wider powers of taxation have also been granted. Presidents and vice-presidents are now non-officials elected by their respective boards. The policy during the last decade has been to give more power and responsibility to the local boards and, where control is still exercised by the State, it is used solely for the purpose of safeguarding the interests of tax-payers, especially in cases where State funds have been lent. The funds at the disposal of the boards consist chiefly of the local fund cess on land revenue, other sources of revenue being receipts of ferries, tolls on local board roads, quarrying fees, etc. The boards also have power to levy, with the sanction of the Commissioner, such local taxes as the local authority is authorised to impose under Section 80A of the Government of India Act. In addition, considerable grants are made by Government for education, roads, water supply, village sanitation and maintenance of dispensaries. The management of schools is now almost entirely handed over to these bodies.

Every district in the presidency has a district board. There are 27 such boards and 220 taluka boards. The total income of the boards is over two crores. The incidence of taxation varies from district to district, the maximum being in Broach, 12 annas 3 pies, the minimum in Ratnagiri, 10 pies. In 1925-26, the aggregate expenditure of the boards chargeable to current revenues was Rs. 173 lakhs. The main heads of expenditure were administration, education, medical relief, and public works. The boards spent Rs. 85 lakhs on education, Rs. 7½ lakhs on medical relief, and Rs. 40 lakhs on public works. The government contributions to the expenditure under these heads were Rs. 75 lakhs, Rs. 1¾ lakhs, and Rs. 19 lakhs respectively.

On the review of the administration of local boards for 1924-25, Government remarked: "The working of the boards was, on the whole, fairly satisfactory. The chairman and members have evinced greater interest and energy in their work. Generally, the boards were opposed to additional

taxation and are prone to depend upon Government for increased grants from provincial revenues for works and objects of purely local importance. This resulted in inadequate attention to medical needs and to neglect of roads, etc. The principal question which the boards have to face courageously and to solve is one of finance."

Besides these local boards, there used to be, in some of the bigger villages, committees known as sanitary committees and for certain groups of villages, boards known as sanitary boards. These were formed under the Village Sanitation Act and had the power to raise a small cess for sanitary purposes. Most of these committees and boards have now been superseded by *panchayats* formed under the Village Panchayat Act, a recent enactment. *Panchayats* have been formed in other villages as well but their number is small and they have not as yet proved a great success, the chief obstacle in their way being their unwillingness to raise money by taxation.

13. PUBLIC HEALTH AND SANITATION.

The Department of Public Health is controlled by a Director assisted by five officers. It also runs the Vaccine Institute at Belgaum and certain public health laboratories. The chief duties vested in the department are the supervision of the sanitary conditions of the people and the recording of health statistics, reporting on the prevalence and prevention of disease, advising local authorities as well as Government on schemes and questions relating to sanitation and suggesting precautionary measures against epidemics in general.

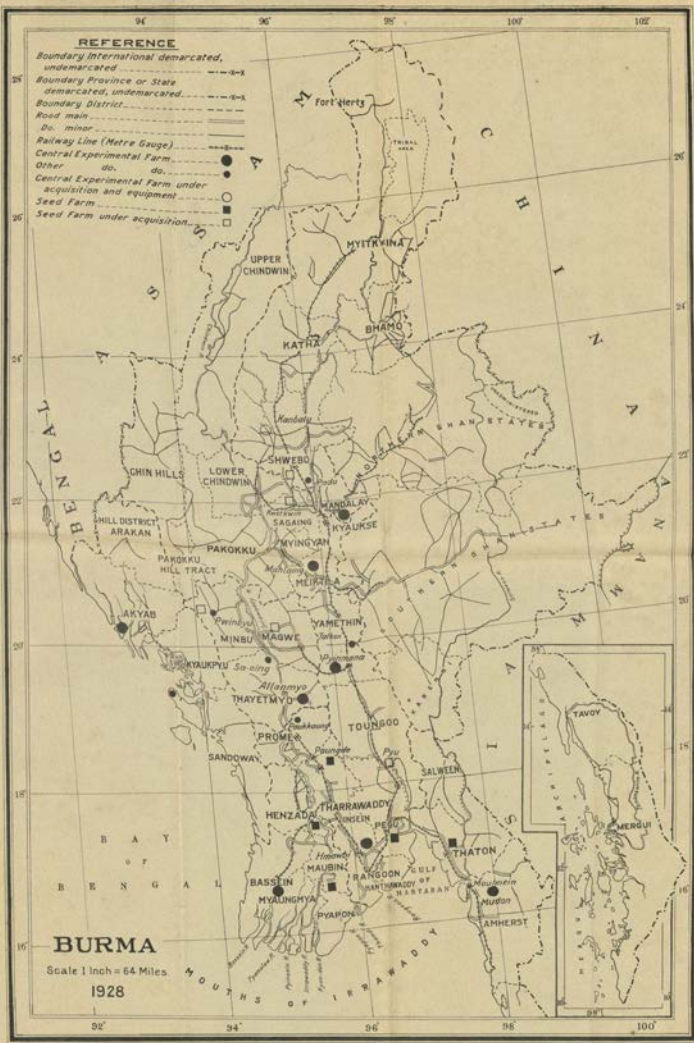
The department is handicapped for want of an adequate staff. Much of its work is done in urban or semi-urban areas. The prevention of epidemics such as the cholera epidemic which used to be a common feature at fairs in former times is a notable example of the success achieved by the department. Health conditions in the villages are not very satisfactory. As the Director of Public Health remarks in his annual report, "the extent to which sanitation or the lack of it affects the material prosperity of the rural population must be considerable though it cannot be accurately estimated in the absence of statistics showing the number of persons incapacitated by sickness day by day throughout the year." Although the health of the rural population of the presidency may be said to compare favourably with that of other provinces, there can be no two opinions as to the urgent necessity for improvement. The death rate for the rural areas is about 25 per 1,000 as compared with 11·6 recorded in England and Wales in 1923.

Medical dispensaries are established in towns and large villages. To bring medical aid to small villages Government have decided to give a trial to a scheme which is known as the Village Aid Scheme. Arrangements are made to train primary school masters in elementary medicine and first-aid help. The work though recently started has been highly spoken of by local officers and there is a demand for an extension of the scheme.

A scheme of subsidising private practitioners to induce them to settle in small towns in rural areas is also before Government.

In recent years, health propaganda is being carried out in various parts of the presidency by Baby Weeks and Health Weeks. This propaganda, though originally started in urban areas, has now begun to reach the villages. An important part of the work of the Public Health Department is vaccination. The number of those vaccinated each year comes to nearly 700,000 persons and as many as 100,000 were re-vaccinated last year.

Half of the total mortality is from fevers. Epidemics like plague and cholera have been very considerably brought under control. The water supply in certain villages gives rise to intestinal troubles. The influenza epidemic of 1918 took a severe toll in most parts of the presidency.


REFERENCE
Boundary International demarcated, undemarcated
Boundary Province or State demarcated, undemarcated
Boundary District
Road main
Do. minor
Railway Line (Metre Gauge)
Central Experimental Farm
Other do. do.
Central Experimental Farm under acquisition and equipment
Seed Farm
Seed Farm under acquisition
BURMA
Scale 1 Inch = 64 Miles
1928
Fort Hertz
TRIBAL AREA
MYITKYINA
UPPER CHINDWIN
BHAMO
KATHA
Kanbalu
SHWEBO
Indu
LOWER CHINDWIN
CHIN HILLS
MANDALAY
Kwetswin
SAGAING
KYAUKSE
HILL DISTRICT ARAKAN
MYINGYAN
PAKOKKU
PAKOKKU HILL TRACT
Mahlaing
MEIKTILA
AKYAB
Pwinbyu
YAMETHIN
MINBU
MAGWE
Yatkon
Pyinmana
KYAUKPYU
Sa-ning
Allanmyo
THAYETMYO
Paukkaung
TOUNGOO
PROME
Paungde
Pyu
SANDOWAY
SALWEEN
THARRAWADDY
HENZADA
INSEIN
PEGU
THATON
Hmawbi
MAUBIN
RANGOON
GULF OF MARTABAN
BASSEIN
MYAUNGMYA
PYAPON
Moulmein
Mudon
AMHERST
TAVOY
MERGUI
BAY OF BENGAL
MOUTHS OF IRRAWADDY
BENGAL
ASSAM
CHINA
SIAM
NORTHERN SHAN STATES
SOUTHERN SHAN STATES
ARCHIPELAGO
KEDAH
Offset
Govt Photozinco Office, Poona. 1928.

BURMA

1. GENERAL FEATURES.

Burma is the northern part of the Indo-Chinese Peninsula and the most easterly province of the Indian Empire. It comprises all the country enclosed by the eastern off-shoots of the Himalayas and the sea. In the northern part it consists of high mountains; towards the south these mountains open out into separate ranges enclosing river valleys, while along the sea border is a flat coastal strip. It is shut off from India on the north-west by a mass of densely forest-clad mountains ranged in steep and high ridges running nearly north and south and intersected by deep and narrow valleys inhabited by wild tribes. These mountains form a barrier which has kept the peoples of the two countries separate in race, language, religion and customs. Its total area is given in the census of India as 233,707 square miles and in area it is the largest province of the Indian Empire, being more than twice the size of the United Provinces of Agra and Oudh; more than one-third larger than Madras; and nearly twice the size of Bombay. It lies between Assam on the north-west and China on the north-east and between the Bay of Bengal on the west and south-west and Siam on the south-east. Waterways form its main means of internal communication, while sea communications furnish the principal commercial link between Burma and the outside world, including the other provinces of the Indian Empire.

The main physical features of the province are its mountains and its rivers. The chief mountain ranges and their spurs run nearly north and south and make communication east and west difficult. The ranges gradually become lower as they run south and as they receive a bountiful rainfall they are plenteously covered with forest and other vegetation. The rivers of Burma are the key to its physical geography. They are three in number, the Irrawaddy, the Salween and the Sittang and flow from north to south parallel to the line of the mountain ranges. Their effect on the natural divisions of the country will be explained in the next section.

The rainfall varies greatly from tract to tract of the country, and, on the Arakan and Tenasserim coasts on which the monsoon coming across from Ceylon makes its first impact, the annual rainfall averages over 200 inches. In the Irrawaddy delta the average is about 100 inches. Here the monsoon breaks, as a rule, early in May and continues till the end of September. In Central Burma, between the Arakan Yomas on the west and the Shan Hills on the east, conditions approximate somewhat to those of the Indian Deccan. The Arakan Yomas protect this tract from the south-west monsoon and there are often long breaks of rainless

weather in the monsoon season. The average rainfall is a little over 30 inches. This is the only part of Burma where scarcity is at all likely to occur. The water channels are dry except in the wet season and there is a great deal of island and river bank cultivation as the Irrawaddy subsides after the rains. North of the central dry tract lies the Upper Burma wet zone comprising the districts of Katha, Bhamo, Myitkyina and part of the Shan States. The rainfall here varies considerably and ranges from 50 to 100 inches.

As most of Burma lies in the tropics, the climate generally, except in the dry zone of Central Burma, is hot and damp. On the hills to the north and east it is more temperate but Burma usually escapes the extremes of heat and cold to which northern India is subject. The maximum temperature in Lower Burma seldom rises to 100°. In Central Burma, it may reach 110° to 115°, but this excessive heat is compensated for by cooler nights in the winter months. In the Shan States and the Chin and Kachin Hills the elevation gives a temperate climate, the thermometer seldom rising above 80°, and in the colder months there is frost at night.

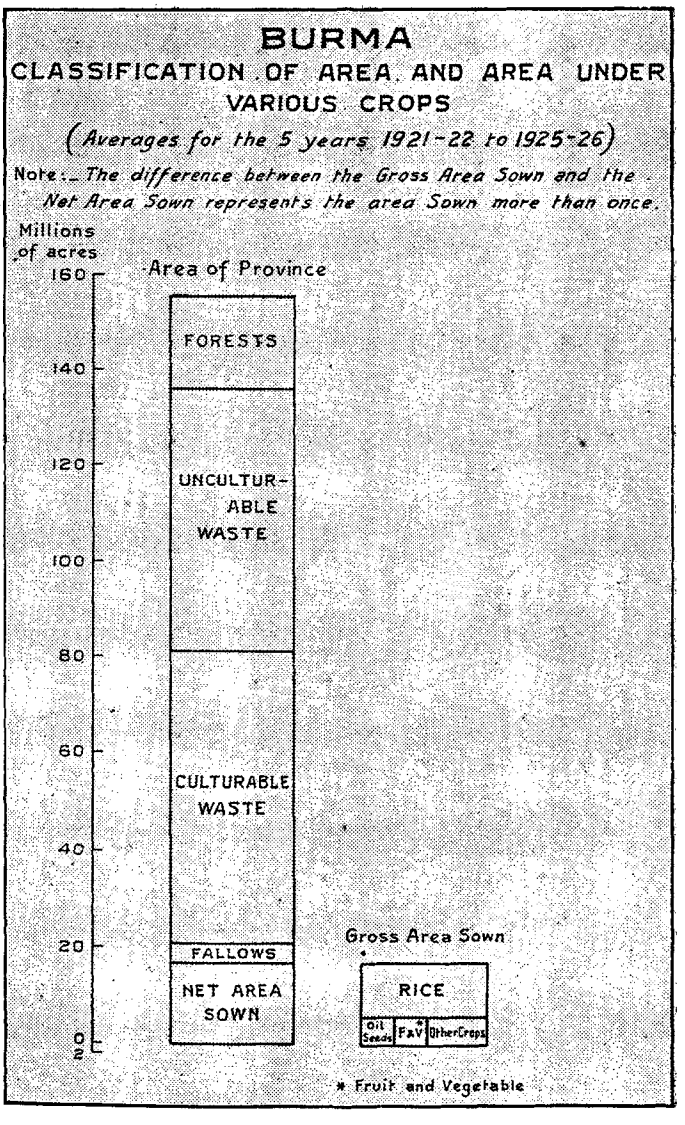
The agricultural practice of the country is almost entirely dictated by the rainfall and so much of the province has an assured and ample supply of rain that it is not surprising to find that rice dominates the agricultural energies of the country. Thus of the total occupied area, in 1925-26, of 19,969,425 acres, 11,558,371 were under rice. The acreage under all other crops was 4,473,894 acres only, of which sesamum contributed 1,132,862 acres, beans 795,005 acres, millet 700,789 acres, groundnut 498,587 acres, cotton 449,168 acres and fruit gardens 370,840 acres. Minor crops are maize 199,388 acres, gram 118,166 acres and wheat 48,202 acres. The valuable crops, tobacco and rubber, occupied 83,665 and 79,222 acres respectively.

It is estimated that the culturable waste available is over 21 million acres, but this figure is purely conjectural.

As regards livestock, the supply of working bullocks would appear to have kept pace with the demand although prices have risen greatly in the last few years in sympathy with the rise of prices of other agricultural products. The last Season and Crop Report gives the number of working bullocks at 1,890,950, bulls 637,127, cows 1,391,797 and young stock 995,097. In Lower Burma and in the wet zone of Upper Burma, the buffalo is an animal of great agricultural importance and the figures for them are, buffalo bulls and bullocks 364,530, buffalo cows 401,094, buffalo calves 672,024. Sheep are relatively unimportant and thrive only in the central dry zone. They number 73,871. Goats are numerous though they receive little attention and number 620,696. Pigs are kept by Karens and the hill tribes and amount to 371,170. Horses and ponies number only 84,353.

2. NATURAL DIVISIONS.

The agriculture of Burma is determined almost entirely by considerations of rainfall and the province divides naturally into four main regions



To face page 141

or tracts. The first and most important of these is the Lower Burma wet tract which comprises the Arakan, Tenasserim and Pegu divisions with a rainfall varying from 80 to well over 200 inches. In this tract falls the rich delta of the Irrawaddy and a narrow strip of level land in Arakan and Tenasserim between the mountains and the sea. This is the great rice tract of the province—entirely rain-fed. The area under rice has increased as follows :—

	Acres
1896	5,451,541
1906	9,283,801
1916	10,070,250
1926	11,558,371
1927	11,797,303

The export figures for the last ten years to India and elsewhere have been :—

Year	India	Elsewhere	Total
	Tons	Tons	Tons
1917	659,824	891,986	1,551,810
1918	487,148	1,314,744	1,801,892
1919	2,175,176	418,590	2,593,766
1920	1,342,856	724,212	2,067,068
1921	1,432,850	804,096	2,236,946
1922	1,050,313	1,493,308	2,543,621
1923	796,967	1,453,937	2,250,904
1924	692,737	1,811,356	2,504,093
1925	1,427,867	1,967,838	3,395,705
1926	1,041,713	1,861,982	2,903,695

Apart from rice, a certain amount of sugarcane is cultivated on the alluvial land along the banks of streams while most villages of importance have groves of mangoes or coconuts. Tenasserim has valuable gardens of the much-prized durian and mango steen fruits peculiar to Burma and the Malay States. In Tenasserim also are found the principal rubber plantations.

The soil of the delta consists of old alluvium of great depth. On the ridges and foot-hills the soil is sandy or lateritic. Along the banks of the Irrawaddy and other rivers there are considerable stretches of

new alluvium on which such crops as beans and tobacco can be grown in the cold weather.

North of this wet alluvial tract lies the Upper Burma dry tract which occupies practically all the central belt of the country. In general appearance the country is undulating, consisting of low hills of tertiary formation. In Mandalay, and Kyaukse, however, there are large tracts of level land under cultivation. The soils vary from stiff black clay on the lower grounds to light sands and gravels on the slopes and uplands. Where irrigation is available, rice is exclusively cultivated as also in the valleys where it is rain-fed. Where irrigation is not available, dry cultivation is engaged in, the principal crops being the millets, maize, cotton, sesamum, gram, beans and groundnut. The introduction of this last crop, largely through the agency of a government garden, has completely revolutionised the agriculture of the dry zone and in twenty years its cultivation has advanced from practically *nil* to 460,000 acres.

The Upper Burma wet zone comprises the northern districts of the province, Katha, Bhamo, Myitkyina, the Upper Chindwin and parts of the northern Shan States. Vast tracts of country are available for cultivation here. The sparsity of population, difficulties of labour and the unhealthiness of the tract are limiting factors. Paddy is cultivated in the lowlands and shifting cultivation on the hills. In Myitkyina, a serious attempt is being made to grow sugarcane on a factory basis.

The last tract is the Shan States, a federation of States under the Governor of Burma. This tract has great agricultural possibilities, consisting as it does of a vast plateau extending from the eastern boundary of Burma to the Chinese frontier with an elevation of from 3,000 to 6,000 feet. Development is retarded however by lack of population and communications. Excellent potatoes are grown in the States while the wheat produced is of good quality.

The division between these climatic zones is not precise or definite and in them we come across areas of intermediate rainfall. For instance, between the Lower Burma wet tract and the central dry tract lies Pyinmana with a rainfall of from 50 to 80 inches where the best sugarcane in the province is cultivated. Cattle breeding is almost entirely confined to the dry zone and the Shan States, it being practically impossible to produce young stock in the wet tracts of Lower Burma or in the northern wet range. The cattle produced in the dry zone and in the Shan States are yearly driven down in huge droves for sale to the cultivators in the riverain tracts of Lower Burma.

3. PROVINCIAL INCOME AND EXPENDITURE.

The receipts and disbursements of the Government of Burma from 1921-22 till 1926-27 are shown in the following statement. The provincial contribution, originally Rs. 64 lakhs, was reduced for the years 1925-26 and 1926-27 and has been permanently remitted from 1927-28, and some Rs. 50 lakhs have thus become available for

the ordinary purposes of administration. From the point of view of agriculture and general rural uplift, the most interesting feature is the progressive expansion of expenditure on education, medical relief, public health, agriculture and industries.

GOVERNMENT

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue	531	496	472	571	534	523
Excise	98	112	119	116	124	133
Stamps	49	50	58	62	67	66
Forests	221	183	178	182	210	217
Other heads	38	5	5	12	16	21
Railways	..	..	1	..	..	..
Irrigation	4	42	36	39	43	24
Debt Services—						
Interest	5	6	8	13	13	11½
Civil Administration—						
Administration of Justice ..	7½	9	9	11	11	12
Jails and Convict Settlements ..	4½	4	4	4	5	5
Police	4½	6	6	9	5	5
Education	3	4	4	5	5	6½
Medical	1½	2	2	2	2	2½
Public Health	..	..	..	1	1	1
Agriculture (including Veterinary and Co-operation) ..	..	..	1	1	1	1
Industries	..	..	..	..	..	..
Other departments	1	1	1	2	4	3½
Civil Works	6	8	10	13	9	13
Miscellaneous	31	6	8	7	5	8
Miscellaneous adjustments between Central and Provincial Governments ..	7	..	..	2	..	..
Extraordinary Receipts ..	..	..	..	..	9	3
Total, Revenue Receipts ..	1,012	934	922	1,052	1,064	1,056

OF BURMA

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue	54	51	51	57	69	68
Forests	93	102	102	97	81	84
Other heads	18	22	21	22	34	26
Capital outlay on Forests charged to Revenue ..	..	..	..	..	8	8½
Railways	37	65	—109	..	..	—5
Irrigation—Revenue Account ..	33	66	49	46	45	36
Irrigation—Capital Account charged to Revenue ..	9	9	7	8	24	23
Debt—Interest	—14	—17	—13	—14	—14	—25
Civils Administration—						
General Administration ..	84	92	95	106	101	106½
Administration of Justice ..	43	49	55	59	62	65
Jails and Convict Settlements..	24	26	30	27	29	30½
Police	148	141	142	132	135	149
Ports and Pilotage ..	23	32	30	30	19	8½
Education	59	67	73	79	97	113½
Medical	31	33	34	36	38	48
Public Health	8	7	9	8	11	24
Agriculture (including Veterinary and Co-operation) ..	13	16	19	20	20	20
Industries	2	1	1	3	4	4½
Other departments ..	3	8	7	4	4	5½
Civil Works	190	203	213	192	243	233
Miscellaneous	46	51	69	75	70	87
Provincial Contribution ..	64	64	64	64	44	50
Miscellaneous adjustments between Central and Provincial Governments ..	30	2	..	2	1	31½
Total, Expenditure charged to Revenue	998	1,090	9,459	1,053	1,125	1,192

GOVERNMENT

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Receipts						
Revenue Surplus	14	..	..	..	..	..
Famine Insurance Fund ..	1	..	..	0½	0½	1
Depreciation Fund ..	..	..	..	..	..	1½
Loans and Advances by Provincial Governments ..	23	27	26	37	44	27
Total, Capital Receipts ..	38	27	26	37½	44½	29½
Opening Balance ..	572	585	368	304	279½	243
Total ..	610	612	394	341½	324	272½

OF BURMA

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Expenditure						
Revenue Deficit	..	156	27	1	61	136
Famine Insurance Fund ..	..	..	..	..	..	..
Depreciation Fund ..	..	..	..	..	..	0½
Loans and Advances by Provincial Governments ..	25	88	63	61	20	29
Total, Capital Expenditure ..	25	244	90	62	81	165½
Closing Balance ..	585	368	304	279½	243	107
Total ..	610	612	394	341½	324	272½

4. REVENUE ADMINISTRATION AND LAND RECORDS.

The tenure of agricultural land in Lower Burma is simple when compared with the variety of tenures found in other provinces. Briefly put, the ownership of land is regarded as vested in the State but by continuous possession for twelve years and the regular payment of revenue over that period, an occupant is given the status of a landholder. This gives him a permanent, heritable and transferable right of use and occupancy of his land, subject only to the payment of all such revenue tax, cesses and rates as may from time to time be imposed in respect of such land under any law for the time being in force and to the reservation to Government of all mines and mineral products and of all buried treasure. In order to establish his position as a landholder and to acquire a title deed as against the State, he is entitled to receive on application a landholder's certificate. Land may also be granted to cultivators for all time or by lease or given on licence for a specified period. Subject to the strict observance of the conditions attached to these grants and leases, the cultivator obtains a firm possession of his land as against Government or third parties. Where a cultivator has not obtained the status of a landholder or has not taken out a grant, licence or lease, he is a tenant-at-will of Government until he has attained twelve years of uninterrupted occupation and theoretically is liable to ejectment without compensation during these twelve years. This power of Government is, however, only used in cases where non-agriculturists have obtained possession of land. In Upper Burma, land is divided into two categories, non-State and State. Non-State land was land in which the Burmese kings were understood to have recognised the existence of proprietary rights against the State. No rights against the State can be acquired on State land by occupation throughout a period of time or, as the regulation puts it, "an occupier of State land can have no heritable or transferable right of use or occupancy therein nor can any rights adverse to the Government exist in such land unless they have been created or continued by a grant made by or on behalf of the British Government." In the case of non-State land, a landholder has complete proprietary rights and is practically in the position of the person who has attained landholder's rights in Lower Burma. But rights to non-State land cannot be acquired in respect of land which was not declared non-State land when the tenure was decided after enquiry by Government. A consolidated land law applicable to Upper and Lower Burma is under consideration and will probably be introduced shortly in the form of a Bill in the Legislative Council.

Practically all occupied land in Burma has been cadastrally surveyed and mapped on a scale of 16 inches to the mile. Every field is surveyed in detail and the map is kept up to date by the local surveyors who are supposed to measure up new cultivation and mark other changes every year and bring the map up to date. This work is in the hands of the Land Records staff who maintain annually an accurate survey, a record of persons liable to assessment and an annual crop marking of all crops. The Land Records Department is a very strong one and

consists of revenue surveyors dealing with from 10,000 to 15,000 acres with inspectors, usually one to each township,* all working under the Superintendent of Land Records. The Superintendent of Land Records and his establishment are under the immediate control of the Deputy Commissioner who is responsible for the proper carrying out of all land records work. The whole department is under the control of the Commissioner of Settlements and Land Records.

Before land records, however, we have the settlement, which is not such an elaborate affair as it is in India. There is no settlement in the sense of an engagement made by a farmer to pay so much revenue in respect of so much land for such and such a period. The only things which are settled in Burma are rates of assessment and the period for which these rates are to be in force. The settlement officer in fact originally laid the foundation of all the revenue assessment and collection. He started off with a clean map provided by the Survey of India and entered the boundaries of every holding on the map. He then prepared a list of the persons in occupation of the land and proceeded to arrive at his assessment rates by crop cuttings to ascertain the fertility of the soil. On these results the land is divided into fertility classes. Enquiries into cost of production, the value of produce over a period of years and rents and mortgages are all recorded and he arrived at a theoretical rate on a proportion of the surplus left when the cost of production is subtracted from the average value of the produce. This theoretical rate, which Government claims as its right to take as revenue, is one-half of the net produce, but in point of fact this maximum is seldom, if ever, attained. Rents are only beginning to be a factor in the fixation of assessment rates though competition rents have always been taken into consideration. As a rule, settlements are for twenty years at the end of which period the settlement is revised. Enhanced rates notified after revision settlement must not exceed the expired rates by more than thirty-three per cent during the first five years of the new settlement nor during the next five years exceed sixty-six per cent, while allowance is made to cultivators who have incurred expenditure to improve their lands by the granting of exceptional and favourable terms. Assessment in Burma is a fluctuating assessment and separate rates are notified for separate assessment tracts within a district. Whenever waste land is brought under cultivation, the new area is measured up and assessed generally at the same rates as land in its immediate neighourhood. In Lower Burma, a nominal acreage rate of two annas is assessed on land which is left fallow for special reasons. But in Upper Burma in the dry zone all land not cultivated is exempted from assessment. In Lower Burma where a crop is destroyed by floods or other natural cause, the land is not assessed and in the dry zone of Upper Burma, if the crop is less than three-quarters of normal, it is considered a total failure and completely exempted from assessment.

After the original settlement, the settlement party handed over to the Land Records Department their maps with the boundaries of holdings

* An administrative unit corresponding to a local revenue division of a district in India (*tehsil*).

marked and the holding register and these it is the duty of the Land Records Department to keep up to date. This holding register is only a record and has no presumption of validity. The Land Records staff merely enters against each holding the name of the person who appears primarily liable to revenue as in possession of the holding directly under the State and any dispute must be settled by the civil court. Where mutations are ordered by a court, they are communicated to the surveyor by the court. Mutations by registered holders must be brought to the surveyor's notice, and it is incumbent on all parties to alienation to report these to the revenue surveyor.

On his holding register and on his map, as corrected, the revenue surveyor draws up his annual assessment register. He has also in the course of his field inspection recorded statistics of the areas under different crops and of tenancies, mortgages and sales. When the rolls of the assessment season are complete, he prepares a tax ticket for each holding and these tax tickets are issued from the Deputy Commissioner's office.

The total expenditure on the Land Records Department for 1925-26 amounted to Rs. 25,46,158, including figures for Rangoon and the special survey party. The percentage cost to total assessment (excluding figures for Rangoon and the special survey party) was 5·99.

5. THE CULTIVATOR.

The total population of Burma at the census of 1921 was 13,212,192, of whom no less than 9,158,932 were engaged directly or indirectly in agriculture. Although Burma is the largest of the Indian provinces, it is by far the most sparsely populated and the bulk of the population lives in villages which number 35,048 as against only 79 towns. The balance between males and females is very level, there being 6,756,969 males and 6,455,223 females.

The density of population per square mile in Burma stands at 57 as against 226 for all provinces of India, but beyond the statement of this fact no useful inferences as to under-population or over-population can be drawn. In some districts where cultivation is widespread, the population is naturally denser than in those where there is a large amount of forest or unculturable waste and it is enough to state the figures without trying to draw any particular conclusions. There are three principal races of Burma, the Burmese, the Karens and the Shans while in the north and north-west part of the province we find the Chins and Kachins. Of these by far the most important are the Burmans, and the predominating religion of the country is Buddhism in which at the last census no less than 11,172,984 persons affirmed their belief. Buddhists are more than 5½ times as numerous as all the non-Buddhists put together and are nearly 19 times as numerous as the Animists who are the next largest class.

The ordinary village habitation is a hut raised on piles some little distance off the ground, built of jungle timber and bamboo matting and roofed with thatch or split bamboo. Better class houses have plank walling and floors and corrugated iron roofs are more and more being adopted. The house as a rule consists of a front verandah and an upper room which is reached by a flight of steps. The front verandah is used

as the living room of the house, the cooking generally being done outside on the ground or in a small kitchen at the side of the building : the upper room forms the sleeping accommodation of the family.

The Burmese dress is very attractive. The male dress consists of a jacket which is generally white, a cotton or silk coloured skirt (*paso* or *longyi*) and a silk head covering (*gaungbaung*). The women wear a jacket resembling the men's and a petticoat or skirt of silk or cotton. A gaily dressed Burmese holiday crowd is a very pretty sight as the brilliant colours of their silks get their full value from the bright sunshine.

The life of the average cultivator is made up of periods of arduous and exhausting labour in the fields followed by considerable spells of comparative idleness. But these slack periods are fully taken up by pagoda festivals or *pwès* (theatrical performances) and the observance of other social and religious customs which tradition has imposed upon him. During the seasons he is not employed in the fields, he resides in his permanent dwelling in the village. In the rainy season, when the cultivation of paddy or other crops absorbs all his energies and attention, he spends the greater part of his time in the fields, and, for convenience in working his land, he builds there a temporary bamboo hut where he can live with his family or hired labourers and with his working bullocks beside him.

In the drier tracts there is a greater variety in the choice of a dwelling place and it is more common to find the cultivator living throughout the year on his holding. Even in the paddy plains of Lower Burma permanent homesteads are becoming common in some districts, but the homestead as such is not a feature of the country-side. This herding together in villages is partly due to the natural inclination of the cultivator himself and partly to the operation of the Burma Village Act, which, for purposes of crime control, discourages the erection of permanent dwellings outside the boundaries of the village site.

The agricultural year may be said to commence with the break of the rains in May. In the paddy tract, field huts are built and firewood stored during the slack months of April and May and the nurseries are got down by the first fortnight in June. Ploughing and harrowing the remainder of the holding and the transplanting of the main crop are carried on into August, and in some of the later districts, may extend even into early September. But from then onwards till the latter half of November, when the early paddies begin to ripen, there is little field work to be done.

Harvesting becomes general during the first half of December and by the middle of January most of the crop in even the latest districts is off the ground. Threshing and winnowing the paddy occupy the greater part of February and by March the bulk of the crop has found its way into the hands of millers and brokers, or into the godowns of traders in the towns and villages who hold it for a rise in the market.

In the dry zone, the operations and seasonal work are of course different and probably cover a greater part of the year. But in all tracts, except in some of the irrigated areas, there is the same alternation of busy and slack periods with a more or less general cessation of agricultural activity in the hot weather.

The size of the average holding varies a great deal with the district but is generally a simple multiple of the area which can be ploughed by a pair of bullocks. Especially is this the case in the Lower Burma paddy plains where agriculture has become industrialised into the production of a single crop mainly for export, and where mixed farming is unknown. In these tracts the general allowance is one yoke of bullocks to every twelve acres although this proportion may vary from eight to fourteen acres in heavy and lighter lands. In Upper Burma, where farming is more mixed and carried out on a less extensive scale, the area worked by one pair is fifteen acres, but the yoke of bullocks in Upper Burma plays a smaller part in fixing the size of a cultivator's holding. In the dry tract, we find very small holdings associated usually with garden cultivation or worked as a part-time occupation by a cultivator who has another non-agricultural source of income; but as a sole means of livelihood the diminutive holding, frequent in parts of India, is by no means common.

The Land Record Department has produced a Table which shows the size of the average holding in Upper and Lower Burma :—

	Under 5 acres	Over 5 Under 10	Over 10 Under 20	Over 20 Under 50	Over 50
	Per cent	Per cent	Per cent	Per cent	Per cent
Lower Burma	55	15	15	11	4
Upper Burma	62	20	12	5	1

The figures in this Table, however, have little agricultural significance, for they refer only to complete holdings owned by individual landowners in arbitrarily fixed areas of about 600 acres called *kwins*; the actual area worked by a cultivator as a farm unit with the assistance of his family and hired labour is more. This unit is given in several settlement reports for particular districts, and the Agricultural Department has recently collected figures throughout the greater part of Burma which indicate more nearly what this unit is. In Lower Burma, it is comparatively large but declines in size northwards through the drier zones. The following figures, although not based upon a sufficient amount of data to give reliable averages for whole districts, convey a better impression of the size of holding met with most frequently :—

Crops	Districts	Average size of holding in acres	Crops	Districts	Average size of holding in acres
Paddy ..	Hanthawaddy ..	67	Cotton ..	Myingyan ..	8·8
	Insein ..	40		Thayetmyo ..	4·4
	Pegu ..	35	Sesamum ..	Yamethin ..	14
	Tarrawaddy ..	17	Sugarcane, beans ..		
	Thaton ..	81	Paddy ..		
	Bassein ..	34	Paddy (Upper Burma).	Mandalay ..	7·9
	Myauungmya ..	26			
	Maubin ..	23			
	Akyab ..	17			

Quite large farms of 200 to 250 acres are found in Hanthawaddy, Pegu and Thaton districts worked by tenants on a yearly lease and, although these are not numerous, they demonstrate the system of agriculture which has been induced by the industrialisation of the paddy crop grown mainly for export.

The mention of tenants and hired labour indicates that peasant proprietorship is by no means universal in Burma. In an inquiry carried out into the condition of agricultural tenants and labourers by Mr. Couper in 1923, it was found that, in the places where figures were collected, an average of thirty-eight per cent of the land was worked on yearly tenancies and that in some townships it rose to as high as seventy-two per cent. This refers to Lower Burma where land is freely bought and sold by both agricultural and non-agricultural classes and where, by foreclosure, the small owner cultivator has frequently to part with his land in settlement of debts during a succession of bad seasons.

A small owner cultivator frequently rents additional land to work with his own, or he may hire out his own land and rent a larger holding to cultivate himself. The rents are almost always paid in kind and are fixed at so many baskets per acre usually representing from one-fourth to as much as one-half of the total produce. It is customary for the owners to pay the land revenue which varies from Rs. 1-8 to Rs. 4-8, Rs. 5 or Rs. 6 per acre according to the productiveness of the soil.

Tenancies are for a period of one year and the cultivator frequently changes his holding. Mr. Couper, for instance, found that out of ninety-nine cultivators only twelve had been in the same holding for more than four years. There is no great sentimental attachment for family reasons amongst owners and cultivators to particular land; and, as already indicated, paddy land is regarded among owners almost solely in the nature of an investment to be bought and sold as occasion demands. Affection for a paddy field does not exist, but where dry land is concerned, as in Upper Burma, sentiment plays a more prominent part and frequent changes of ownership are not so common.

Peasant proprietorship is the rule in Upper Burma, but in Lower Burma absentee landlordism with its attendant evils is a conspicuous feature of the paddy tracts. The larger landowners live in the towns and hire out their land yearly to the highest bidder. This unstability of tenure acts as a severe handicap to progressive agricultural improvement, for the cultivator can never be sure at the beginning of a season whether he will get his own land back again, or, indeed, whether he will get any land at all. If he loses his holding he may become a labourer for the year and hire both himself and his bullocks to some one else; but this represents a drop in status to be remedied, if possible, in the succeeding year by again becoming a tenant should land be available.

In spite of the large holdings and the comparatively extensive form of agriculture pursued, there is, as yet, enough land to go round if fairly distributed. The density of the population varies, of course, from district to district, being greater in the rice lands of the delta and diminishing

in the dry zone and towards the hills. The delta, although comprising only fifteen per cent of the total area, contains thirty-seven per cent of the population and the more densely populated districts are naturally found in this sector. There are four dense patches in the areas influenced by the large towns of Rangoon, Mandalay, Moulmein and Akyab, but even here the population is sparser than is common in India. The most dense population is in Maubin district with 201 persons per square mile, and the least dense Myitkyina with a figure of only 11 per square mile. Dry zone districts vary from 54 in Thayetmyo to 179 in Sagaing, the latter coming to a certain extent under the influence of Mandalay.

With a comparative plenitude of land and the lack of any custom insisting upon the subdivision of holdings among the members of his family on the decease of an owner, fragmentation of holdings in the Indian sense constitutes at present no problem whatever in Burma. When an occasion for the division of a property arises, the land is generally sold and the proceeds divided.

The Burman cultivator stands high among his Eastern fellows in respect of literacy. Owing to the existence of Buddhist monastic schools in almost every village, the vast majority of the village boys are taught the rudiments of reading and writing. A heavy percentage lapses into illiteracy after such imperfect instruction, but those who remain literate into the adult stage constitute a proportion of the population which is more than three times as large as that in any other province of India. The 1921 census gives the following comparative figures :—

Average number of literates per 1,000, aged 10 or over

Males		Females	
Burma	India	Burma	India
576	101	123	23

The standard of literacy is not, of course, high, but the Burma figures include only those who are able to indite a simple letter to a friend ; and most cultivators are capable of signing their names to a document even though they may not be able to read it completely or entirely understand its contents. Within recent years there has been a great expansion of vernacular newspapers. These find their way into most of the villages, especially those near the main roads and railways, and the happenings in the outer world, the prices of cotton and paddy in the main towns and all the miscellaneous items of news that go to make up a vernacular newspaper are available to most cultivators. The newspapers are very widely circulated and extensively read, the more enlightened villager reading them aloud for the information of his less advanced brethren.

With the means at his disposal, the Burman cultivator cultivates paddy and other crops in an intelligent and fairly efficient manner. As a ploughman and paddy cultivator he is better than the average Indian immigrant; his fields are cleaner and better planted, and he shows more discrimination in the selection of varieties best suited to his land. As, however, it takes eight men to reap the crop which five men have sown, the Indian labourer is in considerable demand at harvest time and a good deal of the crop is reaped by such casual labour on contract rates. As has been previously noted, the total number of immigrants to Burma by all routes during 1926 was 408,464, and although a very large number of these are permanently employed at the large ports and at the rice mills in the seaport towns, a considerable number seek only seasonal employment in the reaping of the paddy crop. In 1906, 342,597 emigrated back from Burma so that the balance of immigrants over emigrants was only 25,877. These become absorbed permanently in the industrial labour round the large cities, very few of them settling down in the country areas.

As he is able, as a rule, to obtain a comfortable living by his seasonal work, the Burman shows little inclination to exert himself to accumulate wealth, and thrift is not one of his marked characteristics. The Burman is notoriously generous and when funds are available money is spent freely either on religious objects or on giving entertainments for the amusement of his fellow villagers. When the money is gone, resort is had to the moneylender or landlord for the means of financing the next year's crop. On account of his light-hearted attitude to the accumulation of wealth, chronic indebtedness is almost universal amongst the cultivating classes and the greater the credit the greater usually is the debt which is incurred. When the cultivator borrows from the *chettyar* (a member of a Madras banking caste) on a strict business basis of security, the rates of interest vary according to the security tendered and are by no means as high as when he borrows from his landlord or village Burmese moneylender on the basis of repaying his debts in kind after harvest. The latter method of borrowing is most popular in the villages as the *chettyars* are somewhat strict in demanding security and are now unwilling to advance money on land. Loans of this nature—that is, repayment of debt in kind after harvest—are taken during the cultivating season, the basis being a sum of money for which a hundred baskets of paddy are paid back in February. The following Table indicates the scale of repayment required:—

Loan taken in	Amount of loan	
May	Rs. 60 to 70	Repaid in February by 100 baskets of paddy worth Rs. 160 to Rs. 170.
July	,, 80 to 90	
August	,, 100	
September	,, 110	

6. THE AGRICULTURAL DEPARTMENT.

The history of the Agricultural Department may be divided into three periods. The first is the period anterior to 1906 when agriculture was under the Director of Land Records and Agriculture. Under this administration, action on the agricultural side was spasmodic; there was no trained agricultural staff and a few government gardens under amateur enthusiasts represented the limit of effort. To these gardens, however, was due the introduction of the groundnut which has brought such great agricultural wealth to the province.

The second period dates from 1906 when a civilian Director of Agriculture was appointed. An agricultural chemist joined the staff that year and two deputy directors of agriculture were appointed in 1907. A period of acute financial stringency, in which the very existence of the department was threatened, followed by the outbreak of the great war, brought operations practically to a standstill and it was not till 1918 that a forward step could be taken. But even in this period two large experimental farms were opened at Mandalay and Hmawbi, and various smaller district farms of about twenty acres in extent for the trial under local conditions of new strains of seed produced on the central farms at Mandalay and Hmawbi. During this period, the posts of economic botanist and of third deputy director of agriculture which had been sanctioned were not filled and the idea of an agricultural college was abandoned largely on account of financial stringency.

With the cessation of hostilities, Government was in a position to devote more attention to the Agricultural Department and a comprehensive reorganisation scheme was sanctioned by the Secretary of State in 1919. This scheme was in general endorsed by a committee appointed by the local Government which reported in 1925, and as a result of the local Government's orders on that report the department is now constituted as follows.

The department is divided into two sections, the one dealing with field experiments, district demonstration and propaganda and the other with agricultural teaching and research. For the purposes of field experiments and district demonstration, the province is divided into eight circles, each under a deputy director of agriculture. This excludes the Shan States for which it is hoped that two deputy directors will ultimately be appointed when financial circumstances permit. At present an arrangement has been made by which work in the Shan States is superintended by deputy directors of agriculture stationed in Burma.

It is the intention that each of these circles should ultimately have a central farm. Up to date five such central experimental farms have been opened at Hmawbi, Pyinmana, Mahlaing, Allanmyo and Akyab while the large farm at Mandalay, which is now the college farm, has up till now served the purposes of the Northern circle. Two more farms are now being equipped at Mudon in the Tenassarim circle and Myaungmya in the Irrawaddy circle and, with the selection of a central farm for the Northern circle, the chain of central farms will be complete. There

are also subsidiary farms for special crops at Pwinbyu, Padu, Tatkon, Thayetmyo and Kyaukpyu.

The main duties of the deputy director are research on the agricultural problems of his circle. His first duty is to discover what these agricultural problems are and, having found them, to experiment on the central farms with a view to finding a solution. When a solution has been found he must endeavour to have it introduced into the general agricultural practice of his circle by demonstration and propaganda. He is assisted in the work of his circle by an assistant director, who is a member of the Burma Agricultural Service, two senior agricultural assistants for demonstration and propaganda work and the supervision of subsidiary farms, and two senior agricultural assistants on the staff of each of his central farms. Great emphasis is laid on the importance of seed distribution and propaganda work. A considerable amount of this is done through the assistance of the Co-operative Department while in some tracts agricultural unions for the distribution of pure seed have been found very effective. The village or group of villages under a village headman is taken as the unit and in each union there is one or more privately owned seed farms which multiply pure strains for distribution to the individual members of the union. The necessity for the rapid multiplication of pure seed strains has been fully realised and it is the policy of the department to provide a connecting link between the central experimental farms and the agricultural unions or co-operative societies by the provision of seed farms in the areas where pure seed can be rapidly multiplied. In pursuance of this policy a number of areas, varying from 50 to 100 acres, have been taken up by purchase or by exclusion from grazing grounds so as to provide as large a number of such farms as possible. These will be let out to approved tenants of the Agricultural Department who will be responsible for the maintenance of the purity of the seed and, to a large extent, for its distribution. Some of these farms in the more important centres will be equipped with seed godowns and quarters for an agricultural assistant and fieldman so that the growing of the pure seed crop can be kept under the closest observation.

As has been pointed out above, the department was only organised in 1919 and the full recruitment of a superior staff sanctioned under that scheme was not completed till 1923. The result is that the work of the department is still largely in the experimental stage, and it is only in the Southern and Northern circles, which existed prior to 1919, that it has been possible to develop work on any organised scale. At the same time a few outstanding results have been achieved. For instance, in the Myingyan circle, which is one of the main cotton tracts of the province, a high yielding strain of cotton with a ginning percentage of 36 as against the ordinary 31 to 32 per cent is under distribution and seed has been given out for 5,000 acres. Both the *kapas* and lint of this strain can be disposed of at a premium of Rs. 5 per 100 *viss*,* but at present the crop is bought back by the department, ginned by them and the seed

* The viss = 3·6 lbs.

distributed by sale to cultivators. Further promising varieties have been obtained by selection and hybridisation. These have been submitted to the Cotton Technological Research Laboratory, Bombay, for spinning tests and as these have proved satisfactory the varieties will be thoroughly tried out under field conditions.

In the Lower Chindwin area the gram crop was practically wiped out by a wilt disease and the devastation was so general that Burmans called this area the "gram cemetery." By the introduction of an immune variety the Agricultural Department has totally replaced the local crops.

The work of the Central circle with headquarters at Pyinmana is largely concerned with sugarcane. A central farm of 54 acres was acquired in 1924 and the buildings and equipment have just been completed. The duties of its deputy director will be an intensive study of sugarcane in all its aspects and although too little time has elapsed for any particular results to be achieved, the existence of the farm has resulted in the introduction of sugarcane into several new areas in the neighbourhood. There is a ready demand for all available supplies of exotic canes for planting.

The central farm of the West Central circle is located at Allanmyo and extends to 143 acres. Its concern will largely be cotton and the improvement of the Lower Burma strain of that crop. In this circle two subsidiary farms have been opened, one for the study of tobacco and the other for irrigated rice in the Mon Canal area. From this farm, which has been in existence for a number of years, improved strains of paddy have been introduced in the Mon Canal area. The total seed distributed to date is 213 tons and there are now 52 private seed farms multiplying the strains for distribution.

The Southern circle dates back to the earliest days of the Agricultural Department and at that time was responsible for practically the whole of the experimental work for Lower Burma. Its field of operations has now been considerably restricted. The area of the farm is 450 acres—400 acres of rain-fed paddy land and 50 acres of garden land. The main object of the farm is to investigate problems connected with the cultivation of paddy under Lower Burma conditions, and, in particular, to improve the quality and yield of varieties suited for the export trade. Pure line selection from indigenous races has been the method adopted to improve the paddy varieties grown in the country and no less than 1,043 strains in all have been dealt with. As a result, seven improved strains of paddy are at present being distributed to suit most of the conditions met with in Lower Burma. The amount of pure improved seed issued from this farm last year and from its attached seed farms was 550 tons, sufficient for 24,652 acres. In addition to this work of selection, experiments on the manurial requirements of the soil and the utilisation of indigenous manures have been carried out, as also experiments in seed rates and methods of planting. The central farm has a ring of seed farms around it to demonstrate the results obtained on the farm to the cultivator in the district. Twenty seed farms, totalling 1,216 acres, have been opened and ten more farms, totalling 532 acres, will be opened

shortly. In addition, it is proposed to open two larger seed farms equipped with godowns at two of the main centres. These larger farms will have an area of 155 acres and 125 acres respectively and will act as the main centres of seed distribution of the two outlying halves of the circle. In the three other circles, the Irrawaddy circle, the Arakan circle and the Tenasserim circle, little progress has been made as these circles have only recently been constituted and the farms have not yet been fully equipped. In the first two the improvement of paddy will be the principal problem, and in the Tenasserim circle, although this will also be the principal crop, fruit and coconut will occupy a good deal of the attention of the deputy director.

The scientific research work of the department is concentrated at the Agricultural College and Research Institute at Mandalay, the research officers being also professors in their subject at the Agricultural College. In the field of agricultural chemistry the agricultural chemist has for many years been engaged in an investigation into the prussic acid content of Burma beans (*Phaseolus lunatus*). This enquiry was forced upon the department by the trade as one or two unfortunate accidents in feeding cattle, which had been attributed to Burma beans forming a part of their diet, had very seriously affected the market for this product. After many years' study the conclusion arrived at is that the prussic acid cannot be eliminated from the beans by selection and the efforts of the department are now being devoted to research for a substitute. The work has now been handed over to the economic botanist who has under trial 80 varieties of indigenous and exotic beans with a view to finding prussic acid free substitutes for the Burma beans of commerce.

From time to time a large amount of work has been done on soil surveys and systematic surveys of two districts are now in hand. The object is to discover, if possible, a co-relation of soil types with paddies particularly suited to such types, a work which when successfully completed will be of permanent value. Apart from these systematic surveys detailed, surveys have been made of all the government farms and a large number of surveys for private applicants. Another line of work is a series of analyses with a view to investigating the possibilities of the manufacture of citric acid and the extraction of essential oils. An investigation of some interest and of a rather peculiar nature was undertaken by the agricultural chemist at the instigation of the Department of Public Health. Frequent complaints were received that the process of parboiling of paddy amounted almost to a nuisance to the neighbourhood in which the operation was carried out on account of the supposed noxious gases which were given off in the process. The problem has been completely solved and the improved process has been adopted by European millers and others in Burma. It is understood that it has also been taken up in the Federated Malay States, in Siam and in Ceylon. In addition to these particular lines of investigation a great amount of work has been done in the analyses of soils, manures, fertilisers, oil-seeds, etc., for the Agricultural Department and for other departments of Government and the public. It may be noted that great difficulty has been experienced in recruiting suitable trained assistants for the

subordinate staff. But this state of affairs will doubtless be remedied when the Agricultural College begins to function.

Until the arrival of an economic botanist a large amount of botanical work was done by the deputy directors in Upper and Lower Burma. Now that an economic botanist has been appointed to the staff he has been given a separate area and establishment on the college farm at Mandalay on which all the plant breeding and selection work in connection with rice and various dry zone crops is carried out. The area devoted to plant breeding and selection is 20 acres and in connection with the college a teaching garden containing representative species of the various natural orders is being laid out while a fruit garden will also be opened for purposes of instruction. In addition to this, the economic botanist has free access for work to certain of the central farms. Work at present is being mainly devoted to paddy, wheat, gram, beans and sesamum, but here again, as in the chemical section, much difficulty is experienced in getting a trained staff of assistants.

A mycologist was appointed to the staff in 1923 but the college laboratories for his accommodation were not completed until 1924. A beginning has been made with the study of various fungus diseases of sugarcane, sesamum, *juar*, wheat, gram, cotton, betel vine and groundnuts, while a considerable amount of advice has been given to rubber companies and to sugarcane, tea and coffee estates.

An entomologist (who is a member of the Burma Agricultural Service) deals, so far as he can, with the vast number of insect pests to which the crops of Burma are subjected. Considerable success has attended efforts to deal with palm beetle and with land crabs both of which are serious pests of the province. Attention has also been devoted to lac culture, the object being to work out a practical method of growing lac on cultivated plants for cultivators in the plains while some experiments have also been carried out in bee-keeping. The most important part, however, of the work of the entomologist has been in connection with sericulture. Here the lines of work have been first to find out a multivoltine race of worms suitable to local conditions. Considerable success has been achieved in this direction, two strains having been obtained which are wholly multivoltine and give a much higher yield of silk. The other main objects are to work out the best method of growing mulberry under the varying conditions in the hills and plains of the province and to study the economics of the industry from the point of view of the rearer. Efforts are being made to foster the industry by the supply of mulberry cuttings and seedlings and of eggs or seed cocoons of improved races which have been examined and guaranteed free from disease, while the question of reeling has also been taken up and efforts made to introduce the industry into new districts.

The agricultural engineer is fully occupied with the routine work of the department and with the manufacture of improved implements, water-lifts and other agricultural appliances. A new type of plough has been designed and put on the market. At present these are manufactured in England, but a local blacksmith at Pyinmana is also turning out these ploughs in quantity for local sale and to supply orders

from the Agricultural Department. There seems no reason why the manufacture should not ultimately become local. The manufacture of improved water-lifts, introduced by the agricultural engineer, has been taken up by certain village carpenters and they are being sold freely. A new type of jaggery-boiling furnace has also been designed which is capable of burning the dried stems or megass. This effects a very marked economy in fuel. In addition to his actual work on agricultural machinery the agricultural engineer has also the supervision, in some cases, of the construction of the smaller departmental buildings on the farms.

It is to be regretted that practically no progress has been made in the matter of stock breeding or dairying, but it is now proposed that the Tatkon farm should be devoted to cattle breeding, the object being to build up a herd of pure Burmese cattle and also to conduct certain experiments in cross-breeding.

An interesting feature has been the establishment of agricultural improvement committees which have been formed in five districts. These are largely non-official though for the time being the deputy commissioner of the district or the deputy director of agriculture acts as chairman. The functions of these committees are mainly advisory and may be defined as follows:—

(1) The committees act in an advisory capacity to Government in general and to the Agricultural Department in particular in matters relating to the agricultural improvement and development in a district.

(2) The committees arrange for the holding of shows and exhibitions in the district.

(3) The committees make recommendations with regard to the grant of loans or grants-in-aid under the Land Improvement Loans Act and carry out such other duties as may be referred to them from time to time by the local Government.

The main results achieved by the department up to date may be briefly summarised as follows. It is estimated that 200,000 acres of rice in the province are under selected varieties distributed from the Hmawbi and Mandalay farms. The superior value of this rice is now recognised by the market both in London and on the Continent. It is free from the objectionable red grain, is of a uniform shape and consistency and when milled gives an increased outturn which averages about three baskets of white rice per hundred baskets of paddy milled. Premia are paid by millers of all classes for paddy grown from the Agricultural Department's seed, these premia varying from Rs. 5 to Rs. 15 per hundred baskets * of paddy.

In certain parts of Upper Burma, the gram crop was almost entirely eliminated by the fungus *Fusarium udum*. The soils had become so impregnated with this disease that it was impossible to grow the crop more than one year on the same ground. The Agricultural Department tackled the problem and, after experiment with varieties received from every province in India, a variety from Karachi which was found to be

* Baskets vary but average weight is 46 lbs.

fairly immune was placed under selection with the result that a completely immune strain was evolved and seed multiplied. In 1923, enough seed of this immune variety was distributed to sow 28,000 acres. The distribution has continued with the result that the old variety has been completely ousted. The Director estimates that the annual money value of this piece of work is nearly as much as the present expenditure on the whole department.

In cotton, work has hardly advanced beyond the experimental stage but the selected varieties with a higher ginning percentage have been distributed and 5,000 acres sown with this seed. Cambodia cotton has also been introduced and distributed in suitable areas, the total area now being about 6,000 acres. Similarly new types of groundnut, showing an increase of 15 per cent in the oil content and much easier to harvest than the local varieties, have been successfully introduced. Considerable improvements have also been effected in agricultural machinery.

With regard to agricultural education, as has been noted above, the idea of an agricultural college was for financial reasons kept in abeyance until it was revived in the reorganisation scheme of 1918. During this period and until the completion of the college, the province had to rely upon the friendly offices of the Government of Bombay for the training of its subordinate staff and by an arrangement with that Government large numbers of students were trained at the Poona Agricultural College. The Agricultural College at Mandalay was formally opened by His Excellency the Governor, Sir Harcourt Butler, in December 1924. It is well equipped with laboratories which provide ample accommodation for teaching and research in agricultural chemistry, botany, mycology and entomology, while instruction is also given in English, mathematics and physics. There is also an excellent library. The early experiences of the college have not been too happy. Apart from research its primary object was laid down as the instruction of a staff for the Agricultural Department. It was at first proposed to hold a four-years' course leading to a diploma and when the course commenced in 1924 stipends were given to 24 students, for the most part possessing the high school qualifications, with a promise of employment in the upper subordinate establishment in the event of their obtaining a diploma. It was also intended to introduce a shorter two-years' course for candidates for the lower subordinate establishment. The high school final qualification, however, was not found to be satisfactory, the standard being too low and an attempt was then made to substitute a three-years' course with I.A. or I.Sc., as a standard of entrance. The intention was to affiliate the college to the Rangoon University but the scheme had to be abandoned almost immediately owing to the paucity of candidates that applied. A three-years' diploma course is now being started. At the beginning of March, 1927, there were 11 third year students, 15 second year students and 20 first year students taking this course.

Apart from the courses of instruction at the college, special short courses are held at central farms to provide practical instruction for cultivators and their sons. These courses are designed to give practical

instruction in the use of improved implements and to demonstrate improved methods. Stipends are also offered to the sons of cultivators and landowners to enable them to undergo training for longer periods on the central farms.

Outside of government effort, the only other attempt at agricultural education in the province is the Pyinmana Agricultural School—a vernacular school conducted by the American Baptist Mission. Government give grants for building construction up to half the total cost or Rs. 75,000, whichever is less, and a yearly grant for recurring expenditure increasing from Rs. 2,200 to Rs. 18,000. The aim of the school is to give an agricultural education to village boys who have completed the fourth standard of the vernacular primary school. Instruction is entirely in Burmese although English and literary subjects of the middle school course are also taught. The total area of the school farm is nearly 180 acres and the buildings are nearing completion. There were, in 1927, 62 students in the school, but there will be accommodation for 120 when the buildings are completed.

The following statement shows the receipts and expenditure under "Agriculture" for the ten years 1917-18 to 1926-27 :—

Year	Receipts	Expenditure
	Rs.	Rs.
1917-18	17,328	2,66,882
1918-19	20,562	3,84,717
1919-20	31,178	3,10,585
1920-21	20,810	3,84,066
1921-22	34,489	5,05,373
1922-23	40,563	6,50,249
1923-24	54,930	7,83,847
1924-25	61,967	8,17,394
1925-26	57,207	8,98,393
1926-27	62,744	8,51,840

7. THE VETERINARY DEPARTMENT.

The Government of Burma devoted some attention to veterinary matters long before the question of an agricultural department was considered. Thus as long ago as 1876 we find that there was a veterinary instructor in the province and from 1884 onwards a certain number of veterinary assistants. The staff of veterinary assistants rapidly increased until, in 1906, there were 120 with 10 inspectors, 5 deputy superintendents and 3 superintendents. At the end of 1926 there were actually employed 3 superintendents, 7 deputy superintendents, 1 assistant instructor, 22 veterinary inspectors and 226 veterinary assistants.

The special committee which recently investigated the Agricultural Department reported also on the Veterinary Department and on their

recommendations the Government have passed the following orders. The province will be divided into four circles and nine sub-circles, the former being under superintendents and the latter under deputy superintendents. The cadre of the Burma Veterinary Service (Provincial) will be increased from nine to fifteen, nine to be employed in charge of the sub-circles in the district and six at the Veterinary College at Insein. Veterinary inspectors will be increased to twenty-eight and veterinary assistants to two hundred and eighty on pay ranging from Rs. 50 per month to Rs. 150. Simultaneously the standard of education required for admission to the Insein Veterinary College will be raised to the high school final. At present veterinary assistants are appointed after passing a three-years' course at the Veterinary School at Insein. Inspectors are recruited partly by promotion from the rank of veterinary assistants up to two-thirds of the cadre of inspectors and the remainder from amongst students who have taken a diploma at the Calcutta Veterinary College. These students were sent to the Calcutta College with stipends by the local Government. Deputy superintendents are selected from among Calcutta-trained graduates and in rare instances by the promotion of vernacular veterinary inspectors. The province is divided into circles controlled by superintendents of the Indian Veterinary Service and these circles are divided into sub-circles controlled by deputy superintendents. The scheme aims at two veterinary inspectors for each sub-circle and one veterinary assistant for each township. A certain number of assistants are kept in reserve for emergencies or to control frontier stations. District councils are in theory responsible for the health of cattle in their districts but veterinary assistants are paid from provincial funds which also pay for their travelling allowance. They are lent to the district council for the districts to which they are posted. District councils pay their contingent expenses and copies of all diaries go to the chairman of the district council. The head of the Veterinary Department has the power to transfer veterinary assistants from one district to another. In Burma, the duties of the staff are largely determined by the Cattle Diseases Rules, 1914, which apply practically to all areas in which the Burma Village Act of 1907 is in force. Under the Burma Village Act the registration of the death of cattle is compulsory and must be done by the owner within 48 hours of the death. The Cattle Diseases Rules of 1914 lay down clearly the responsibilities of villagers in cases of outbreaks of cattle disease and as to treatment of the carcasses and skins of cattle that die. The system followed in Burma is that of the peripatetic veterinary assistant. There are only four veterinary dispensaries in the province and the public seem to evince little enthusiasm for them. The vast areas of the agricultural districts and the difficulties of moving cattle militate against any wide development of the principle of the stationary dispensary and it is thought that more good is done by the veterinary assistants moving freely from village to village with supplies of medicine and attending to cases in the course of their tours.

In 1923, Government appointed a committee to investigate the question of the Insein Veterinary School and its future. As a result, the school is now being completely reorganised as a teaching and research college.

When this reorganisation is completed, Burma will be independent of other provinces for training its superior staff. A building scheme involving an expenditure of slightly over Rs. three lakhs has been put in hand and the buildings are nearing completion. It is intended that the college should be fully equipped with laboratories both for teaching and research. The entrance standard proposed is the high school final followed by a three-years' course at the college and accommodation has been provided for eighty students. If the standard is kept sufficiently high it will be possible to train students at Insein for admission to the Burma Veterinary Service.

6. IRRIGATION.

Burma is so bountifully blessed by Nature in the matter of rainfall that it is only in the dry central zone that irrigation is of any importance. It may be said that where irrigation is available it is entirely directed to rice cultivation. In fact this crop represents ninety per cent of the whole area under irrigation. On the four major canals of the province no less than ninety-nine per cent of the land irrigated is under rice. It is only in the Kyaukse district that irrigation is devoted to any extent to crops other than rice and this district accounts for about half of the total irrigated area under crops other than the rice crop. Here also a certain amount of double cropping is done, sesamum being sown over a large area before a late rice crop is taken off.

Irrigation was practised by the Burmans long before the British occupation of the country and in fact has been known in the dry zone of Upper Burma from time immemorial. The physical formation of the province militates against irrigation schemes of any magnitude but smaller schemes can be multiplied and the area irrigated in Upper Burma has been trebled since 1901. In many cases, the work has consisted of the realignment and remodelling of schemes originally started by Burman agency.

Irrigation works in Burma were reclassified in 1926 and for purposes of comparison this reclassification may be applied as having existed from 1891, the year from which reliable records are available. The classification is into two groups (1) productive works for which capital accounts are kept, (2) unproductive works for some of which capital accounts are kept and others for which capital accounts are not kept. The first group includes the Shwebo and Mon canals, constructed between 1901 and 1911, and the more important of the indigenous works—the Kyaukse Canal, the Shwetachaung Canal, the Man Canal and the Meiktila Lake. The second group embraces the Mandalay and Yeu canals, the Salin Canal, the Nyaungyan-Minhla Tank and the Kyaukse Tank, for which capital accounts are kept, and all the numerous petty canals for which no accounts are kept.

The average annual irrigation area for five-year periods has increased from 238,331 acres in the quinquennium 1891-95 to 737,883 acres in the quinquennium 1921-25.

The irrigation done by the four major canals has increased from 358,997

acres in 1921 to 406,472 acres in 1925. The area irrigated by productive capital works (group 1) has increased between 1900 and 1925 by 325,168 acres or 206 per cent; that by capital unproductive and non-capital (group 2) by 196,389 acres or 214 per cent. In 1901, the milage of government channels open for irrigation was 593; in 1925 it was 1,717 miles, representing an average increase of 45 miles per annum over 25 years.

The total capital outlay—direct and indirect—on productive works in operation till the end of 1925-26 has been Rs. 1,86,25,709. The percentage of profit on capital outlay (including interest on capital outlay) has been 4·34 per cent and the total income, including water rate and miscellaneous receipts and share of land revenue due to irrigation works, has been 7·72 per cent on the capital outlay. The corresponding figures for unproductive works for which capital and revenue accounts are kept have been Rs. 1,47,96,785 capital: 1·05 per cent profit on capital outlay and 2·48 per cent profit when the total income—direct and indirect—is included.

The four major canals were originally constructed from funds supplied by the Government of India. In 1921-22 the Government of Burma purchased them for Rs. 2,20,98,665 and the revenue from irrigation is now entirely provincial. No water rate is charged. A consolidated rate is levied on all irrigated areas, the Irrigation Department receiving in some cases a credit of a percentage of the consolidated rate and in others the whole rate less a fixed rate credited to land revenue. The object aimed at is to simplify collection of the revenue and it has worked well. In the Shwebo Canal area, the canal revenue staff, whose duties consist of seeing to the distribution of water and checking areas irrigated, has been amalgamated with the land revenue staff and it is proposed to extend this system to other districts. The policy is to amalgamate the irrigation revenue staff and the land records staff so far as this is possible and so effect economies in revenue collection. Up till now the revenue has always been assessed and collected by the revenue officers.

In a country like Burma where there are so many natural waterways and where the control of these natural waterways and protection against flood are of almost equal importance with that of the provision of water through irrigation channels, it is but natural that a great deal of the work of the Irrigation Department is devoted to questions of navigation and embankments for the prevention of floods.

On the side of navigation there are two important canals in Lower Burma maintained by the department which are of great importance in the commercial development of the province and on which tolls are levied by Government. The first is the Pegu-Sittang Canal completed in 1877-78 and the other the Twante Canal completed in 1916-17. The former canal connects the Sittang with the Pegu river and enables timber from the Sittang Valley to be floated to Rangoon *via* the Pegu river. It also carries a considerable traffic of rice, vegetables, bamboos and firewood. The Twante Canal carries a very heavy traffic in rice from the delta districts to the Rangoon mills and also provides a short cut for river steamers coming from the delta to Rangoon. The Pegu-Sittang Canal

has never paid for its upkeep directly, though it is a very useful waterway and probably makes indirect contribution to the revenues of the province by the commercial advantages which it gives. In 1925-26 the gross revenue was Rs. 1,95,141, the working expenses being Rs. 7,65,972. The Twante Canal, on the other hand, brought in Rs. 5,77,421 in the same year, the working expenses being Rs. 3,60,562 and the net revenue Rs. 2,16,859 representing a profit percentage of 4·2 on the capital outlay. This canal was constructed from funds supplied by the Government of India, but it was purchased by the local Government in 1921-22 for Rs. 45,64,692.

In Upper Burma, the only navigation canal of any importance is the Shwetachaung Canal in the Mandalay district which combines the functions of an irrigation and a navigation canal. This has never been a considerable source of income to Government and, as a metre gauge line is being constructed parallel to the canal and it is proposed to construct a metal road along the canal bank, it is likely to cease to be used as a navigation canal for the carriage of goods by water.

Within recent years nearly twenty-five lakhs of rupees have been spent in cutting new waterways and improving existing ones in the Irrawaddy delta to facilitate communications between stations in the delta and Rangoon and expenditure approximating to Rs. 16 lakhs is in contemplation. All these improvements, while they give no direct return, facilitate the movement of agricultural produce to market and materially improve the trading conditions of the country.

The third branch of the activities of the Department of Irrigation is concerned with embankments, the majority of which are regarded as productive as the department receives a credit of fifty per cent of the gross land revenue demand on the areas protected by them. These embankments have been in existence for many years, the Maubin Island and the main Irrawaddy embankments dating back to the early 'eighties.' The capital cost of the seven embankments which are regarded as productive was Rs. 48,86,617, protecting in 1924 an area of 848,891 acres and yielding a net revenue of Rs. 5,84,116. These figures show a return of nearly twelve per cent on the capital cost of the works taken collectively. In addition there are numerous small protective works up and down the delta which are regarded as unproductive and in many cases small embankments have been made and are maintained by the cultivators themselves.

Finally, it only remains to remark that great attention is now being devoted to projects for improving the drainage of areas liable to floods. An interesting system of river training without embankments has been evolved by Messrs. F. A. Leete, C.I.E., and G. C. Cheyne, M.B.E., and gives every prospect of permanent success.* The result of this comparatively inexpensive method of river training is to reclaim annually large areas of land suitable for cultivation by a regulated deposit of silt

* "Regulation of Rivers without Embankments." Published by Messrs. Crosby Lockwood and Son, Stationers' Hall Court, Ludgate Hill, London. 1924. Price 30 shillings.

from the streams. Extensive surveys are being made all over Lower Burma with a view to estimating what further steps can be taken to improve the drainage of these flooded tracts.

Reference may also be made to the hydro-electric survey of the province. A rough general survey has been carried out, but a more detailed investigation of certain areas is being undertaken, especially with reference to the provision of a hydro-electrically directed water supply for the city of Rangoon. In this enquiry attention will also be devoted to the possible industrial utilisation of the power generated.

9. FORESTRY IN RELATION TO AGRICULTURE.

The latest report of the forest administration in Burma gives the total area of forest land as 148,376 square miles or two-thirds of the whole province, of which 116,916 square miles are unclassed forests and 31,460 square miles are reserved.

In unclassed forests the control of the Forest Department is generally limited to the protection of certain species, principally teak. For the reserved forests, the Forest Department is directly responsible for the entire management. Little attention can be devoted to the unclassed forests and in consequence promiscuous grazing and unregulated extraction of forest produce are rapidly depleting them of useful growth with the result that they are steadily deteriorating. In the more remote and less accessible forests, the objectionable custom of *taungya* or shifting cultivation, carried out by wandering tribes of cultivators, is having a most deleterious effect on the forests.

In the case of reserved forests, the interests of the cultivators are safeguarded by the forest settlements at which the settlement officer lays down the amount of bamboos, thatch or other forest produce which can be removed under the settlement by the villagers in the vicinity. In 1925-26, the value of produce, including grazing, removed from the reserved forests under the rights and privileges conferred by the settlements was Rs. 2,65,000 and timber for use for house building and other produce granted free under the similar arrangements was valued at Rs. 1,98,000. This, however, by no means represents the total benefits derived by the cultivators from the forests as naturally they take the bulk of their supplies from the unclassed forests which are not under control and no records of such extractions are kept.

It may be noted that apart from direct benefits derived by cultivators from the free utilisation of forest produce, the principal benefit which forests confer on agriculture in Burma is the amount of work provided for the agricultural population in these forests. It may be said that labour required for the trade extraction of timber is almost entirely supplied by the agricultural population. About a million tons per annum are extracted at an average cost of at least Rs. 25 per ton and a very large amount of this total sum of 2½ crores of rupees passes into the hands either of agriculturists who work in the forests in their spare time or of members of agricultural families who can be spared for more continuous

work in the forests. In addition, the constant demand for bamboos for building and for fuel and other minor forest products gives constant part-time employment to the agriculturists while the labour required for the various works necessary for the improvement and maintenance of the forests is supplied almost entirely by agriculturists in their spare time. In fact, in a country where all the houses outside of the larger towns are built of wood and bamboos and roofed with thatch the relations between the agriculturists and the forests are of the closest and not unnaturally the bulk of the work in connection with the extraction of these products is conducted by the agriculturists themselves. The Chief Conservator of Forests estimates the average annual requirements of the rural household in forest produce at, timber 50 cubic feet, firewood 250 cubic feet, bamboos 300 cubic feet, thatch 400 bundles and in practically every case the requirements of the small agriculturist are extracted and handled by himself. The records for grazing show that, during the year 1925-26, only 5,402 buffaloes and 26,474 cows and bullocks availed themselves of grazing on payment. On the other hand, over 150,000 buffaloes and over 340,000 cows and bullocks enjoyed grazing in forests by rights conferred upon the cultivators under the settlement, while a certain amount of free grazing was also granted during the pleasure of Government or otherwise than under the settlement.

At present, it cannot be said that the conflict between agriculture and forests is acute though in the more densely populated parts of Lower Burma there is constant conflict between cultivation and forest rights when applications for the throwing open of a fuel reserve to cultivation come up. Any proposal to throw open a fuel reserve to cultivation is almost invariably opposed by a public opinion equal in strength to that which demands transfer to cultivation and the maintenance of the balance between the conflicting interests of agriculture and forestry will become increasingly difficult as the population increases and as the forests near villages become depleted of the produce which the agriculturist requires for his local needs. The present position may be summed up in the statement that at present the supply of forest produce is generally adequate, but the accessible areas of supply outside reserved forests are being rapidly depleted before the demands of cultivation, grazing and wasteful exploitation. The people now have to go further afield for their supplies and in many cases this has involved such a burden that a recognised trader in forest produce replaces the old system by which the individual extracted his own requirements. In these circumstances, the policy of the future contemplates the gradual absorption of the vast areas of unclassed forests so far as this can be effected either by reservation or by allotment as village waste for the use of definite village communities. The definite allotment of land as village waste has the advantage that the villagers concerned will have the right to protect such land, a right which at present they do not enjoy. In order to meet the increased demand on the reserved forests which has arisen within recent years, considerable attention is being devoted to regeneration and planting up operations. On the general relation between

forests and agriculture in Burma, the Chief Conservator writes as follows :—

"Where the interests of forestry conflict with those of agriculture the problem of correlating them is not always easy. It is accepted as axiomatic that land suitable for permanent cultivation should be released for the purpose unless there are exceptionally strong reasons for retaining it under forest. On this policy the bulk of the reserved forests have been relegated to the hills and those in the plains have been restricted in area to what is essential to supply the wants of the surrounding population. Pressure of population upon the soil is responsible for periodical demands to eliminate the limited blocks of forest that have been retained in the plains. It is, however, generally recognised that a cheap and accessible supply of forest produce is a necessity to the peasant proprietor and this supply cannot be made available unless there is a proper provision for the maintenance of land under forest. A recent careful enquiry into the status of the reserves in the plains on either side of the Pegu Yomas has shown that, when the matter is properly examined, both the district authorities and the people themselves are fully alive to the value of these reserves in the rural economy. In the case of the reserved forests on the hills the demand to push back their boundaries has not arisen and is unlikely to arise in the near future in view of the low agricultural value of the land and in the face of our present policy of working the accessible portions primarily for the benefit of the local people. There will, however, arise at intervals a clamour against the restrictions imposed by forest regulations. In resisting this, much will depend on the extent to which people can be educated to realise the necessity for conserving supplies and to understand that restrictions in the methods of extracting and utilising forest products are necessary for conservative management. The ideal position would be to have portions of the communal lands set aside for the production of forest crops and managed by co-operation under State supervision. Under existing conditions, bamboos are frequently planted as a garden crop, and occasionally an enterprising individual has planted cutch trees for use as house-posts and fuel. There has, however, been little system and no co-operation in the matter, and until these materialise any reduction in the accessible areas of our reserved forests would be a very short-sighted policy, both from the point of view of the State and that of the agriculturist."

10. GENERAL EDUCATION.

The latest report of the Director of Public Instruction shows that the percentage of scholars to the total population in 1921 was 7·01 males and 2·66 females or a percentage total for the province of 4·89. The province has one university consisting of two constituent colleges, the University College, Rangoon, and the Judson College, Rangoon, and an Intermediate Arts College at Mandalay. For males, there are 149 high schools with 40,251 pupils, 1,214 middle schools with 128,483

pupils, 3,913 primary schools with 207,666 pupils and 827 special schools with 13,756 pupils. For females there are 25 high schools with 6,423 pupils, 118 middle schools with 13,306 students, 606 primary schools with 31,171 pupils and 32 special schools with 715 pupils. In addition to this there are 18,449 unrecognised institutions with 202,670 pupils. It may be remarked that the monastic system of education takes a very large place in the education of the rural population. 1,124 of these schools with 72,794 pupils are on the aided list and in addition there is a very large number of private monastic schools roughly calculated at 17,392 with 177,849 pupils. From the point of view of the Education Department these schools are of no great value in the strict educational sense but it cannot be denied that they contribute very largely to the literacy of the province. Thus the census figures for 1921 show an average proportion of literacy over the age of ten as 576 for males in Burma in every thousand as compared with 161 in India, and 123 females in Burma as against 23 in India. It is to be feared however that, as in India, the bulk of the pupils go very little further than standard II. In these circumstances the possibility of introducing agricultural teaching into the ordinary schools of Burma seems very remote despite the higher general standard of literacy in the province. There has, in fact, been no attempt at teaching agriculture in ordinary schools beyond an experiment with school gardening which failed in its object because it was regarded as a vocational subject and not merely as an effort to introduce some pleasant variety into the school curriculum. As a college of agriculture has only recently been opened in the province, no serious attempt has yet been made to tackle the question of agricultural education in other institutions.

The total expenditure on education in 1926-27 was Rs. 1,93,83,804, nearly 21½ lakhs of rupees more than in 1925-26. Of this Rs. 91,26,512 was met from provincial funds, Rs. 25,41,805 from local funds and Rs. 9,59,463 from municipal funds. The balance is met from fees, funds of the Federated Shan States, and payments by missions or managers on account of their share in the maintenance of schools which receive grants-in-aid. It may be remarked that over fifty per cent of the expenditure shown under local funds was contributed by provincial revenues. As in other provinces of India, education is a matter in which the local legislature takes the keenest interest and progress both in expenditure and in the raising of the standard will be rapid.

11. CO-OPERATION.

The co-operative movement is one of great importance and statistics of the movement may be of interest. At the end of June 1926 there were 5,383 societies of all kinds with a total membership of 147,264. The total amount of working capital, excluding sale and insurance societies, was Rs. 4,74,83,833 and the total expenditure on management Rs. 16,48,435. During the last few years, there has been a considerable weeding out of unsatisfactory societies and the number of societies and of members shows some reduction over the last four years.

The apex institution of the movement is the Burma Provincial Co-operative Bank Limited, with headquarters at Mandalay and branches at Rangoon, Thaton and Bassein. The capital of the bank is made up of shares of Rs. 100 each held by individual shareholders and shares of Rs. 100 held by constituent societies and the capital of the bank, at the close of the financial year 1926, was Rs. 6,61,540. Fixed deposits are received from the public at rates of interest which are varied according to the requirements of the bank, but run about 5½, 6, 7 and 7½ per cent for one, two, three or four year deposits. The bank, at the close of the financial year 1926, held fixed deposits of Rs. 85,62,002. An important source of finance also are the deposits in its saving bank section which undoubtedly have induced a spirit of thrift among the people. In addition, certain co-operative societies also deposit their reserve or surplus funds in the provincial bank and over 7¼ lakhs were made available from these sources during the year. The bank has investments in Government paper of over 33¾ lakhs. The Provincial Bank as the apex bank of the system provides fluid reserves for all district banks, town banks and urban societies which seek its assistance and its branch banks at Rangoon, Thaton and Bassein undertake the duty of financing credit societies in their local area and also of attracting local capital.

In addition to the Provincial Bank, there are 23 central banks which perform for small areas the functions of the Provincial Bank from which, if local supplies of capital are not ample, they can obtain funds. Omitting money lent by societies of one class to societies of another class, the net amount of working capital in these central banks was at the end of June 1926 Rs. 49,80,225 and they showed a profit on working of Rs. 1,29,191.

As in other provinces, the most important and most numerous class of society are the primary agricultural societies of which there were at the end of June 1926, 3,919 pure credit societies, 111 tenancy co-partnership and credit and 2 land mortgage societies. These credit societies are of course the base of the whole movement and engage most of the time of the administrative staff. Primary credit societies have a total membership of 87,781 and a share capital of Rs. 37,57,386. The profit for the year amounted to Rs. 3,59,420. The average loan at the end of the year under report was Rs. 197. Above these primary societies are unions for supervision and guarantee numbering 569. These exercise supervision, inspection and primary audit.

In comparison with credit societies, progress in other directions has not been great. For instance, there are only twenty-one agricultural and six non-agricultural purchase and sale societies. There are six agricultural production societies and three non-agricultural production societies. There are 395 cattle insurance societies, confined entirely to five districts in Upper Burma, but it cannot be said that they are very active. It is in district agricultural and co-operative associations and union group boards that the link between co-operation and agriculture is strongest and it is the policy of the Agricultural Department to run private seed farms by the agency of co-operative societies and their members. Some success has

been achieved in Upper Burma where a considerable amount of seed and implements have been distributed through co-operative societies, and private seed farms have been established which are run by co-operative societies and their members. In Lower Burma, progress is slower but the principle is gaining in popularity and the Agricultural Department look to the Co-operative Department for great assistance in the matter of running seed farms and in the distribution of the approved products of the Agricultural Department. The link between the officers of the two departments is close and, as the Agricultural Department supplies the material, the Co-operative Department will be in a position to assist in its wider distribution. From the statistics given, it cannot be said that co-operation has made any very marked impression in Burma as a whole. It is doubtful if more than five per cent of the total population who might become co-operators have as yet joined the movement.

12. COMMUNICATIONS AND MARKETING.

The physical features of the province have been the principal factors in shaping the systems of internal communication as these have been progressively developed. The general conformation of the country is that of river valleys separated from each other by great mountain ranges and these naturally present considerable obstacles to the construction of a general network of roads or of railways such as is possible in the great plains of India. The rivers have been the dominating factor and the tendency therefore has been for trade to establish itself most firmly in those areas possessing natural means of communication by water. In fact, it has been pointed out that only ten of the thirty-eight district headquarters cannot be reached at all times of the year by ocean steamers or river launch. When the British occupied Burma there were practically no roads in the accepted sense of the term, but only jungle tracks, and such roads as were constructed in the early days of the British occupation were designed mainly to link up posts on the frontier with district headquarters. The first road of any importance was constructed in 1861 from Myede in the Thayetmyo district through Prome to Paungde, and ten years later it was continued to Rangoon. When in 1874-77 a metre gauge railway was constructed along this road to connect Prome with Rangoon, a new road was necessitated parallel to the railway. Simultaneously a road between Pegu and Rangoon was constructed and its continuation to Toungoo was contemplated. But with the construction of the railway to Toungoo in 1885 the scheme was abandoned and attention was devoted to the construction of feeder roads. A road was also started from Moulmein, the ultimate terminus of which was contemplated as Ye, but this road has never been completed. Moulmein is now connected with Ye by a railway.

The annexation of Upper Burma diverted expenditure from communications in Lower Burma to the provision of roads for military requirements in the upper province, and frontier troubles led to the construction of numerous roads on the frontier. Fortunately, however, railway construction has kept pace with the general development of

the province, and the line from Rangoon to Mandalay was opened in 1889. An extension from Sagaing on the west bank of the Irrawaddy to Myitkyina was begun in 1890 and opened in 1899. The requirements of the delta were met by the construction between 1873 and 1900 of three canals to connect the creeks at the mouths of the Irrawaddy, Rangoon, Pegu and Sittang rivers to provide inland waterways for country boats. Of these, the Twante Canal is the most important. It has been widened and improved and is freely used by rice traffic while the Pegu-Sittang Canal is now utilised mainly by timber rafts. The third canal, the Sittang-Kyaikto, has become inoperative since the construction of the railway to Martaban. To sum up, at the beginning of the present century the communications of Burma consisted of about 1,100 miles of metre gauge railway line and 8,000 miles of roads of all classes in addition to the inland waterways. Within recent years, there has been a great advance in railway construction and the milage is now approaching 2,000. Rangoon is connected by railway with Moulmein, Bassein, Mandalay, Myingyan, Heho in the Southern Shan States, Hsipaw and Lashio in the Northern Shan States, with Myitkyina in the extreme North and with the Lower Chindwin district. There are now about 10,000 miles of roads. The great difficulty in the maintenance of roads in Burma is the scarcity of metal in Lower Burma and the rapid deterioration of timber bridges which were used in the earlier days. A special sub-committee appointed in 1920 to examine road proposals for the province recommended an expenditure of no less than eight crores of rupees and these recommendations have been accepted by the local Government. The general financial situation also has considerably curtailed development and a great deal more expenditure has been incurred on maintenance and repairs than on original works. This may be seen from the fact that for the decade ending 1910 the average yearly expenditure on roads was only Rs. 18 lakhs for original works and Rs. 21·2 lakhs for repairs and for the decade ending 1920, Rs. 18·8 lakhs for original works and Rs. 33 lakhs for repairs. In 1919, Rs. 75 lakhs were specially allowed for expenditure during the next three years on road improvements and, in 1922, Rs. 244 lakhs were earmarked from the profits derived from the rice control scheme to be spent in conferring permanent benefits on the agriculturists of the province.

Since 1923, a Communications Board, which has been given powers of administration, was formed for the province and since then there has been a distinct forward movement in the matter of communications. It has considered 241 projects and approved of work estimated to cost Rs. 467 lakhs. The most important work sanctioned is the programme of trunk road construction which is to be completed in 1931. An important link in this chain of trunk roads is a bridge across the Irrawaddy at Sagaing, and it is understood that the sanction of the Government of India has now been accorded to its construction. This will link up the east and west banks of the Irrawaddy. Since the appointment of the Communications Board the expenditure, for the seven years ending 1926-27, has increased to an average of Rs. 43 lakhs on original works and Rs. 43·5 lakhs on repairs. The expenditure for 1926-27 on provincial

main roads alone has been Rs. 57·2 lakhs on original works and Rs. 38·9 lakhs on repairs. Of the 10,000 miles of road in the province, 6,000 are main roads which are maintained by the local Government and 4,000 miles are maintained by local authorities as district roads. Up till 1923, the Public Works Department was responsible for the maintenance of district roads, but since the passing of the Burma Rural Self-Government Act, this responsibility rests with district councils or with deputy commissioners in areas excluded from this Act. Where local authorities have not an adequate staff and plant, the Public Works Department undertakes maintenance of the roads. It is estimated that to maintain these district roads at their present standard Rs. 27¾ lakhs is required annually and to this the local Government make a contribution of Rs. 17 lakhs. In order to prevent works being carried out by any district council which are beyond the financial capacity of such district council to maintain, the local Government have limited the capital expenditure on district roads to Rs. 6¼ lakhs per annum and contribute the funds for other approved works which are carried out by the Public Works Department.

In common with other provinces of India, the advent of the motor car is making itself felt in Burma and the number of motor vehicles imported into Burma during 1926 was no less than 2,664. Wherever a road permits of it, motor bus services financed privately are immediately started to connect the surrounding villages with the nearest town, steamer or railway station.

It may be of interest to note the principle that is being followed in the construction of new main roads. Where possible, these follow the general alignment of established cart tracks, but when they run in the same direction as a railway they are generally constructed within two miles of the line and parallel with it, now on one side, now on the other, and crossing the railway at the principal towns or at suitable points about every tenth mile. They thus form lateral feeders to which subsidiary feeder roads of reasonable length may be constructed on either side of the railway to connect with the principal stations, and without such subsidiary feeders having to pass over or under the line. Main roads are from 22 to 24 feet broad, the central 12 feet being metalled with stone, and permanent bridges are now being put in with a 16 feet broad roadway capable of taking a weight of 12 tons. The cost of construction varies from Rs. 30,000 to Rs. 50,000 per mile according to whether stone and laterite are obtainable locally and the cost of maintenance varies from Rs. 1,500 to Rs. 5,000 per mile. Under the direction of the Communications Board and subject to the possibility of providing finance, an extensive programme of road construction in all districts on a definite plan has been initiated and is being rapidly pushed forward.

Marketing.

Marketing in Burma presents no particular features. The chain is from the small village broker to the local dealer residing in the surrounding markets and milling centres and thence to the small local mill or the

large rice mills in Rangoon. Formerly, it was the custom for these large Rangoon mills to give advances to their brokers to enable them to purchase paddy in bulk but it is understood that this custom has now been discontinued.

When a cultivator has threshed and winnowed his paddy, he sets aside enough to pay his land revenue if he is a landowner or his rent if he is a tenant. He then pays his hired labour and any advances he may have taken towards the expense of raising the crop under disposal. He then sets aside his *wunsa* or the amount which he calculates will be necessary for his domestic purposes for the year and the remainder he holds ready for sale. If a small man, he deals with the local village broker who arranges for its transport to the large broker at the local railway station or river siding. The ruling prices in Rangoon are generally well known in paddy-producing tracts and the cultivator seeks, by bargaining with the broker, to obtain a price as closely approximating to the Rangoon level as the broker may be willing to concede. Another matter of dispute is the basket with which the paddy is measured, for the basket varies from village to village in the most extraordinary degree even within a radius of five miles. As a rule, however, an amicable settlement is arrived at and there are few cases of serious dispute. Occasionally, the cultivator gets the advantage of carting his own paddy for which he is paid cart hire.

When the paddy has reached the large broker, various things may happen. If the broker is not working in direct arrangement with a Rangoon mill, he may store it in his own godowns for a rise in the market. Large ranges of these buildings will be seen at all the principal railway stations and at many of the river sidings in Burma. If he adopts this policy, he can hold the crop for a rise in price, or, in other words, speculate on the market. If he does not incline to speculation, he can dispose of the paddy at once to the numerous local small rice mills which within recent years have sprung up in formidable numbers all over the delta or he may forward it at once to the large rice mill in Rangoon. The produce of the small mills either finds its way to Upper Burma or is sold in the neighbourhood of the mill or it may be sent after milling to Rangoon, where it is handled both by the brokers and by the large shippers, in the latter case being frequently re-milled. Another industry which has sprung up within recent years and which is mainly in the hands of the small millers is the parboiling of rice for the Madras and Ceylon markets.

The bulk of the crop, however, is dealt with by large mills in the ports of Akyab, Bassein, Moulmein and Rangoon. These mills classify paddy by the somewhat artificial distinction of rail and river paddy which, so far as they are concerned, merely means the route by which the paddy arrives, although in actual fact there is a slight difference in the quality and class of paddy carried by the different routes. Rail paddy, as a rule, is a short-lived variety and slightly inferior to the boat paddy, which is a long-lived variety. This latter has the advantage that it has generally been put straight from the threshing floor or river siding into

the paddy boats and is therefore cleaner and has suffered less from adulteration.

All the large rice mills have their sidings or jetties and at these the paddy is delivered to the mill from the railway or from the country boat. In Rangoon the method of purchase is on the basis of a 9 gallon basket weighing 46 lbs, a bonus being given for weight in excess of 46 lbs. and a proportionate cut if the paddy weighs less than 46 lbs. There are numerous complaints of collusion between the weighman, the broker and the tally clerk, but these are not serious. It may be remarked that a considerable amount of skill can be exercised in measuring paddy as paddy lightly dropped from a height into the weighing basket may weigh considerably less, bulk for bulk, than does a basketful closely filled and pressed down, but the paddy seller, as a rule, is no fool and is quite capable of looking after his own interests. There are, of course, numerous cases of theft from wagons or boats while in transit or while stored on the threshing floor and at railway sidings, but this is a feature by no means peculiar to Burma. There are also constant complaints of the lack of supply of railway trucks, but, as a rule, the railway administration does all it can to deal with the crop at the rush period.

The marketing of cotton is not quite so satisfactory. As a rule, this crop is grown by a small cultivator who is generally in financial difficulties. In some cases, if his debts are considerable he finances his agricultural operations on credit and on the arrangement that he repays in *kapas* when the crop is plucked. Naturally not much is left to him by the time his crop matures. If his indebtedness is not so acute and if he can finance himself until the picking season, he may still be obliged to have recourse to the village trader for money to tide him over and, here again, the arrangement is to repay the cash loan in *kapas* at a fixed market price. This fixed price, it is to be feared, is generally in favour of the trader and the price must cover the interest on the loan and the risk taken. It is only in rare cases where a cultivator can refuse financial help altogether that he gets the full benefit of his crop.

These arrangements have far-reaching effects, not the least of which is the agricultural disability created. Instead of being able to keep their best seed, these cultivators have to hand over their whole crop to the trader and to buy back from him any seed which he likes to supply. As a result, it is seed of bad germination and mixed seed that comes back to the cultivator and the efforts of the Agricultural Department to improve the crop are, for that reason, handicapped. It is unfortunate that in cotton there is no free market. The cultivator is, in the first place, in the hands of the trader who does not deal with large ginneries direct but works through a broker and thus there is a long chain between the field and the mill, which militates both against the cultivator and against the efforts of the Agricultural Department to improve his crop. The Agricultural Department has attempted to open cotton markets as recommended by the Indian Cotton Committee, but it is understood that no great success has so far been achieved.

The other commercial crop of importance is groundnut and the eccentricities of this market are graphically described by Mr. Chalmers

Development Commissioner, in a memorandum submitted to the Commission from which the following is an extract :—

" The cultivator in marketing this crop is less well organised than in the two crops already discussed. The main markets are on the river bank from Pakokku to Allanmyo. The Magwe market, which is probably the worst from the cultivator's point of view, may be taken as a sample of the seller's experience in disposing of his crop. The cultivator arrives in Magwe,—generally overnight in order to save his cattle travelling in the heat of the day—he puts up at the compound of his broker and early in the morning the local buyer appears on his bicycle and bargaining begins. The buyer examines the consignment and depreciates it as much as possible ; the broker, if he is honest, holds a brief for the cultivator,—by repute he seldom is—his bias is towards the buyer with whom he has many transactions, whereas he sees the seller but once a year. If a bargain is struck, the cart of nuts is chalked, and proceeds to the buyer's godown or dump. Here the usual chicanery takes place. The nuts are delivered on a weight *cum* volume basis. The baskets vary considerably at the various stations. The Rangoon basket is supposed to weigh 25 lbs. and the prices advices are on a F. A. Q. standard. The buyer's measurer takes over on a Magwe basket heaped, which normally weighs 37 lbs. If the Rangoon quotation is, say, Rs. 180 per 100 baskets the Magwe buyer adds to this fifty per cent to cover the basket difference, and deducts Rs. 50 the freight charge to Rangoon to get a starting price ; whatever he is below this is gain—gain of a perfectly legitimate kind: but it is at this point that the cultivator is skinned. From time to time a basket is weighed and should it fall below 37 lbs. a cut is made on the price of the consignment. No bonus is given for an excess in weight as in the case of paddy. The basket is heaped up with nuts and may be pressed down or shaken. In the latter the weight may go up as high as 40 lbs. per basket, and the loss be as much as eight per cent of his crop. The nuts spilled are the perquisite of the measurer ; in a morning's weighing this may amount to something considerable as any ' broken basket ' is also his.

The cultivator is but a child in the hands of the broker and the measurer. If he attempts to adulterate his nuts with husk or shell, he is caught out when the basket is weighed, and the cut is sufficient to cover the buyer's probable loss. Shingle added is easily detected. Watering when the nuts have to travel a long way so that there is time to absorb it, and steaming for quick absorption of weight are resorted to ; but the buyer and measurer meets this every day and can soon detect ' doctored ' nuts. These are the difficulties of the cultivator when the deal is on the straight. What are his chances when the broker takes secret commission, the measurer is a rogue, and the weight false ? For the present indifferent methods the cultivator has himself in part to blame. He has but to organise and he can dictate his own terms provided they are reasonable. He could, if he had sufficient intelligence, less suspicion, and any power to combine, market his produce in an open market, where prices would be known daily on advice from Rangoon, sell by weight which is the best test of good nuts, unless we are going to test for oil content and have proper

stamped scales and a neutral weighman. Until this is done there can be little improvement in the market conditions. To summarise: the ideal we ought to struggle for is :—

(1) an open market with daily market prices published (elimination of the broker);

(2) sale by weight with a bonus for consignments over F. A. Q.;

(3) genuine weighment by neutral tallymen.

The first two can be accomplished if the cultivator through his societies will combine ; but strange to say Magwe district is one of the areas where co-operation has not taken hold.

The third is a difficulty, as honesty is a rare quality, and where it does exist it is apt to be destroyed by the seller or buyer bribing the man appointed to give them a square deal.

The cultivator has been done so often, that he is a bundle of suspicions: the better the plan devised for his good, the more suspicious he becomes: the fact that he cannot detect a catch in a good scheme only confirms him in his belief of the cunning used to invent it. He will in most cases have none of it ; if he does come in, he comes in with the intention of perverting it at the earliest opportunity. Arcadia only exists in the imagination of the poets. The agriculturist enjoys 'slim' practice so long as he is not the victim. Buying by weight is steadily gaining in favour and the other riverine markets have adopted it. Magwe will in time follow. The question of freight has not been examined : but Rs. 50 for the freight of about $1\frac{2}{3}$ tons of nut from Magwe to Rangoon appears to be excessive ; the crop is a bulky one and takes up much space. The Myingyan method of dealing with the nut is more economical. The oil is pressed, the shell burned, and the cake resulting is in the best form for transport. The oil can be disposed of in the province, and the cake exported for cattle-feed. Perhaps the line of advance here is the small mill ; but the difficulty is to deal with the by-product ; the cake in a small unit : it means expensive hydraulic presses and good marketing facilities for the oil and cake if the venture is to be a success."

With regard to the marketing of cattle, this also is somewhat haphazard and there are no real stock markets in the province. As has been pointed out, the dry zone is the great breeding centre of Burma and the animals from this area are drifted down the river on rafts, marched down by road or conveyed by train to Lower Burma. There is a kind of cattle market at Allanmyo in the Thayetmyo district on the east bank of the Irrawaddy and this has attained some reputation and is fairly successful. Should sales not be effected there, the cattle continue their march south to Paungde in the Prome district where a considerable business is also done. Pyawbwe in the Yamethin district is also a large cattle-dealing centre where many cultivators go to buy their supplies, but the markets are not organised or controlled. The ordinary vendor of cattle is the cattle breeder who has his own stock to dispose of, buys a few from his neighbours or is entrusted with the sale of others and starts off on his march southward selling as he goes. The other dealers are large buyers from Lower Burma who go to cattle-breeding centres buying from village to village and on their return disposing of the animals in their own local

areas in Lower Burma. It may be remarked that a considerable number of cattle also come in to the more eastern districts of the province from Siam and the French States.

13. LOCAL SELF-GOVERNMENT.

Local self-government in the sense in which it is known in other parts of India only came into effect with the passing by the local legislature, in 1921, of the Burma Rural Self-Government Act. This enactment provides the basis for the education of the rural population in the responsibilities of representative institutions by transferring the administration of local matters outside municipalities, including vernacular education, from purely official control to elected councils and boards, such local bodies being, as far as possible, neither assisted nor controlled by government officers. Prior to this the only suggestions of local self-government in the accepted sense were municipalities of which, as a rule, the Deputy Commissioner was president with an official or non-official vice-president and in the smaller towns, town committees. Outside these areas rural administration was regulated by the Burma Village Act administered by village headmen and village committees. Prior to its amendment in 1924, the village headman was practically all-powerful within his village tract, but since that date some of his powers have been transferred to a village committee, especially in connection with the trial of civil and criminal cases. Under the Act, it is the duty of the headman to report certain matters to the officer in charge of the nearest police station, for instance, the arrival in his village of any suspected criminal, the committing of or the intention to commit various major offences, the occurrence under suspicious circumstances of any death in his village tract and any matter likely to affect the maintenance of order. His main duty, however, is the collection of the revenue of his tract and the general supervision of his village. Rules have been made under this Act prescribing the duties of the headmen of village tracts in respect of contagious or infectious diseases among human beings and it is also under this Act that are defined the duties of the headman and residents of a village tract in respect of the prevention and suppression of cattle disease. These undoubtedly have formed a very powerful assistance to the Veterinary Department.

With regard to the Burma Rural Self-Government Act, 1921, this Act provides first for the creation of circle boards and secondly for district councils. So far, however, the only functions definitely assigned to circle boards are the election of members to the district councils and the submission of an annual statement of their requirements and estimates of expenditure for the coming financial year. Other functions can be exercised only on the transfer of any matter by the district councils under Section 53 of the Act and, in general, district councils have made no complete delegation of the control and administration of any matters to the circle boards. A further delegation would be from circle boards to village committees which are contemplated in the Burma Village Act as amended in 1924, but since the circle boards have had no functions

delegated to them which they can delegate in turn to village committees under Section 25 of the Burma Rural Self-Government Act, 1921, these committees cannot yet take any place in the scheme of rural self-government as dealt with in the Act. And, indeed, so little has been delegated to circle boards that they are practically moribund.

It is too early as yet to say what success will attend these councils as they only really came into effect at the end of 1923, but there is no doubt that at present they are suffering from lack of trained secretaries, engineers and other staff, while the inexperience of the members is also an obstacle to rapid advance. It thus follows that in the meantime a large number of duties are performed as they were before the introduction of the Act, for instance, village headmen continue to have duties in respect of public health and the health of cattle in subordination to the district officers of Government and independent of the new local bodies, and the Public Works Department does a considerable amount of their road construction and maintenance. These difficulties, however, are merely temporary and will disappear as experience is gained.

The total provincial contributions to district councils during 1926-27 was Rs. 36,73,842. Of this total Rs. 18,83,816 was for education and Rs. 17,90,026 for general purposes*. The total receipts of district councils (excluding opening balance and debt) were Rs. 95,48,474 and their payments (excluding debt) Rs. 76,94,851.

14. PUBLIC HEALTH AND SANITATION.

As a rule, the Burman is vigorous, healthy and active; and although rice is the staple food the population does not suffer from the deficiency of diet which seems to depress other rice-eating groups of India. This is probably due to the fact that his diet is varied and that, even in the poorest household, salt fish forms an integral part of the food ration. In addition, a very large amount of country vegetables and roots are consumed, while the fact that the preparation of the raw paddy in the village hullers does not lead to high polishing or the removal of nutritive portions of the rice probably contributes to the soundness of the diet. In the more congested parts of Lower Burma, however, the very large influx of Indian immigrants, who, in 1925-26, numbered no less than 408,464, tends by the somewhat lower standard of living of these immigrants to depress the average level of nutrition, while there is no doubt that by this same agency a considerable amount of disease is introduced and spread. That the Burman is on the whole better fed than the other races of India may be inferred from the expectation of life figures which were worked out for the 1911 census: these enquiries gave an expectation of life for a Burman male as 31½ years and for a female 32½ years, figures which are only approached by Madras where the expectancy of life for males is 26 and females over 27½. In other provinces the figure is about 21. Added to this is the fact that, except in the largest cities, there is very little congestion of population

* Of this sum Rs. 10,77,844 was for public works, Rs. 3,68,195 for public health and Rs. 2,89,714 for medical purposes.

as Burma is much under populated, the average density of population per square mile being only 68, the next province being the Central Provinces with 139 to the square mile, rising to no less than 608 persons to the square mile in Bengal.

Burma is subject to diseases similar to those which work havoc in India and amongst the most important of these, and by far the dominating disease, is fever in one form or another. When we consider that for six months of the year, the delta of Lower Burma is practically entirely under water and that for months afterwards shallow pools are left scattered about the country—most suitable breeding grounds for mosquitoes—it is not to be wondered at that a large number of the population are constant victims to malaria. This liability to malaria undoubtedly reduces the working efficiency of a large part of the rural population. Plague is now more or less established in the province, principally in Rangoon from which it is liable to be disseminated up-country. Cholera outbreaks are frequent and there is a considerable amount of small-pox. Hookworm disease is also unfortunately present, though so far it has not proved serious.

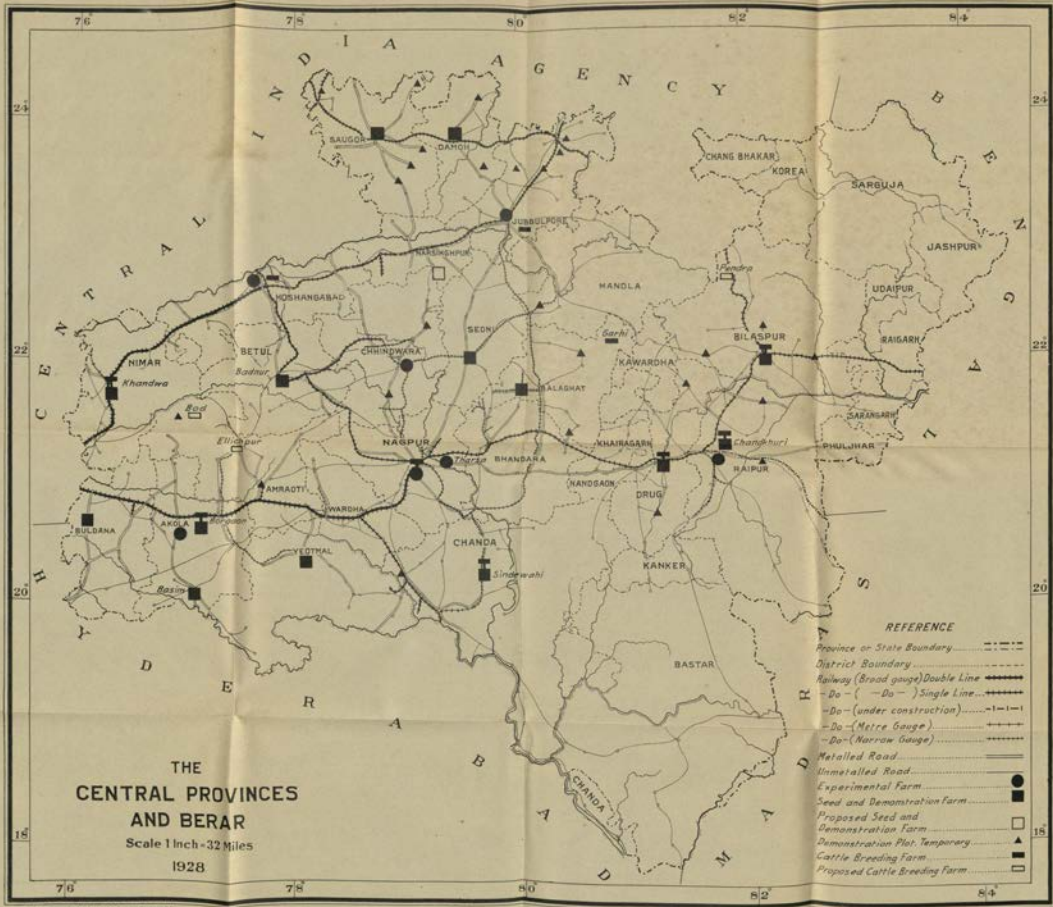
As regards hygiene, the Burman is by habit scrupulously clean and the houses are as a rule also kept in a tidy and orderly manner. There is, however, a tendency to carelessness in the village surroundings and the general custom of keeping the cattle in villages at night as a protection against cattle theft does not tend to improve matters. Wells and drinking tanks are apt to be neglected and the ideas of rural hygiene may be said to be of the most primitive. It may be remarked, however, that as in the delta the population lives in houses surrounded by water for a considerable part of the year, it is not easy to attend to matters of village hygiene though it may also be hoped that the thorough cleansing with water which the villages receive during this period may do something to remove accumulations of filth and refuse.

Within recent years, the Public Health Department in Burma has been very substantially strengthened and during the year 1925-26 the total amount spent in the province on civil sanitary works was Rs. 54·37 lakhs, of which Rs. 18·64 lakhs were devoted to water supply and Rs. 19·8 lakhs to conservancy. In the towns and municipalities the percentage of income spent on conservancy was 6·01 and on water supply 5·87 and the total expenditure on sanitary works was Rs. 49,72,000. But the department is by no means strong enough to deal with the great problems of the country. At present it consists only of the Director with two assistant directors, and in most districts the civil surgeon combines with his duties as medical officer those of district health officer. Recently sixteen Burman sub-assistant surgeons have been placed at the disposal of the Public Health Department but this number must be very much increased if any impression is to be made on the province. A Public Health Institute has been opened in Rangoon and doubtless, with this provision for training, the staff of district health officers will in due course be largely increased.

In conclusion, it may be remarked that very considerable improvement has been effected in the sanitary condition of some of the larger

riverine towns of the delta by raising their level. This has been effected by pumping up sand by dredgers from the adjacent rivers. In some cases this has been accompanied by a new layout of the towns and in these areas the general health has been materially improved.

While the expansion of medical relief has gone on rapidly and there is now practically one medical institution for every 794 square miles of country and for every 45,000 of the population, these schemes hardly touch the needs of the rural population as the hospitals are in the main located in the towns. A scheme has, therefore, been drawn up by which private practitioners and retired sub-assistant surgeons are given a subsidy of from Rs. 50 to Rs. 125 per month provided they will settle and practise in smaller towns where no hospitals or dispensaries exist. At present 13 such practitioners have settled down to practice, apparently with considerable success, and arrangements are being made to extend this scheme and obtain more medical men on these terms. In time it is hoped that by this arrangement modern medicine will be brought within the reach of a greater part of the population, at present dependent on the indigenous Burmese medical practitioners who, as in almost every country, have a large following. Government has devoted its attention to this type of practitioner and schemes for training have been originated which will enable him to bring to his indigenous theory of medicine at least the principles of cleanliness, asepsis and the application of antiseptics.



GOVT. PHOTOZINCO. OFFICE, POONA, 1929. OFFSET.

THE CENTRAL PROVINCES AND BERAR

1. GENERAL FEATURES AND NATURAL DIVISIONS.

The administrative area known as the Central Provinces and Berar is probably the most difficult to describe of all the provinces of India. The tracts comprising it differ widely from each other in circumstances, people and language, while each has its separate history. It has been well said that it was a veritable territorial puzzle that was pieced together in 1861 when the Central Provinces came into existence, and an administrative puzzle was added with the transfer to the same administration of Berar in 1903.

The combined provinces are situated in the centre of the Indian peninsula and comprise a large portion of the broad belt of hill and plateau country which separates the Deccan from the plains of Hindustan. The area of British territory is 82,109 square miles in the Central Provinces and 17,767 in Berar. The following account excludes the fifteen Indian States with an area of 31,176 square miles, within or bordered by British territory.

The combined provinces fall into five natural divisions. In the north-west, the districts of Saugor and Damoh lie on the Malwa plateau, rising sheer from the Narbada to a general elevation of from 1,500 to 3,000 feet. The surface of the country is undulating and broken by frequent low hills covered with a growth of poor and stunted forest.

South of this plateau comes the long and narrow valley of the Narbada, about two hundred miles long and twenty broad. The soil is alluvial deposit of extreme richness, excellently suited to the growth of wheat, but scoured by the numerous rapid streams pouring from the Satpura Hills to the Narbada.

The third division lies south of this valley, being composed of the Satpura Hills which stretch right across the province. The greater part consists of an elevated plateau, broken into volcanic hills, bare stony ridges; and narrow fertile valleys in which the soil has been deposited by drainage. The steep slopes to the plains on either side are traversed in all directions by narrow deep ravines covered with forest. The general elevation is 2,000 feet but several of the peaks rise to 3,500 and 4,000 feet. From this range of hills rise the Narbada and the Tapti rivers which flow westward into the Arabian Sea and the Wardha and Wainganga which flow eastward to join the Godavari.

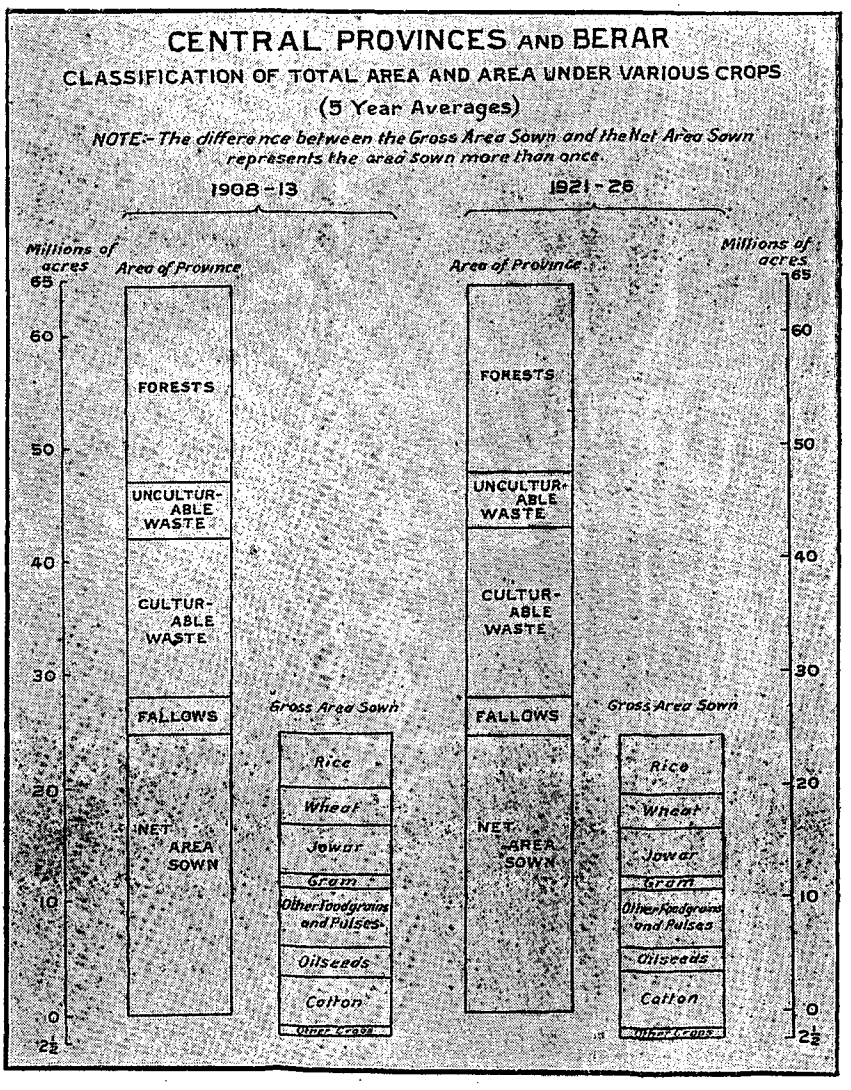
South of this range lies the great plain of Berar, Nagpur and Chhattisgarh. To the west is found the rich black soil which makes this the great cotton-growing tract of the province. Further east is an area of greater rainfall which is mainly rice-growing. It is distinguished by its numerous tanks for the irrigation of rice. Further east again, comes the open country of Chhattisgarh, almost treeless and divided between expanses of small embanked rice fields and ridges of unculturable laterite.

South again, lie two expanses of hill and plateau. To the west are the rugged hills of the Ajanta range rising in the Bombay Ghats, eastwards commences a vast area of hill and jungle ; the dense forests and precipitous mountains and ravines formerly made an effective barrier to invasion or immigration and were shown in the old maps as the Great Wilderness. It has isolated stretches of culturable land, some of good quality and others, capable only of yielding the poorest rain crops, and all inefficiently cultivated and inhabited by primitive Ghonds and other forest tribes. Formerly the wildest and least known part of the whole peninsula, it is now being opened up in all directions by good roads.

Practically the whole of the Central Provinces lies in the catchment area of the rivers Narbada, Tapti, Godavari and Mahanadi, whose sources and catchment basins lie at a considerable height above sea level ; owing to the rapid fall of level, they have cut out for themselves deep beds many feet below the surface of the country. In the rainy season, they become swift torrents ; in the dry they dwindle to chains of almost stagnant pools.

The widespreading flows of volcanic rocks, known as the Deccan Trap, occupy nearly the whole of Berar and eight districts of the Central Provinces. Features of the trap area are the prevalence of long grass, the paucity of large trees, and the deciduous character of almost all the bushes and trees. The majority of the rivers are bounded by strips of alluvium. Manganese, coal, iron, bauxite, steatite, red ochre, limestone, and dolomite which makes excellent building stone are found.

Roughly speaking, four distinct kinds of agricultural land may be distinguished. The first is the heavy black soil which covers the Narbada Valley and the open and level portions of the Vindhyan and Satpura plateaux. It is either alluvial, formed by the deposit of decayed vegetable matter, through the agency of rivers and streams, or has resulted from the decomposition of trap or basalt rock, or from a combination of both agents. This land is suited to the growth of wheat, linseed, gram and other cold weather crops, which are dependent upon the moisture remaining in the ground from the monsoon rainfall and on the showers received during the months of December and January. Water is usually found only at a great depth from the surface, and irrigation is consequently little employed. Embankments to save erosion and hold up water and careful tillage are the main requisites for cultivation. The second class of land consists of shallow black soil, lying in a thin sheet over the surface of the basaltic rock from which it has been decomposed. It is suited for the growth of cotton, *juar* and other autumn crops requiring only light rainfall. The soil responds readily to manure and the application of industry largely increases the outturn. The third class of land includes the light sandy and stony uplands of the Vindhyan and Satpura ranges and the hilly country in the south where the soil is either very shallow or contains a large proportion of gravel mixed with boulders. Lands of this description are the poorest in the province ; they require long resting fallows, and the cheap millets which they produce, constituting the main food grain of the aboriginal cultivators who raise them, are entirely dependent on the rainfall of August and September.



To face page 186

The last kind of land consists of yellow and sandy soil, formed from metamorphic or crystalline rock. It is the principal feature of the rice lands of the province, where the rainfall is heavy. This land, although of little natural fertility, responds readily to manure and irrigation.

In Berar, the soil in the valleys is a light brown alluvium, usually rich and suitable for wheat; the central valley contains a deep rich black loam, exceedingly fertile and often of great depth. The plateaux are covered with fairly rich soil.

The districts north of the Satpuras produce, principally, cold weather crops such as wheat and gram. Of those south of the Satpuras, the eastern ones produce principally rice and the western ones cotton and *juar*. In the Satpura districts, the inferior soil is chiefly devoted to minor millets.

The climate of the more elevated and more northerly districts differs from the rest in that the mean temperature is lower, and the cold season is longer and more marked. The average rainfall in the Central Provinces is 48·5, and in Berar 32·3 inches. The highest rainfall is at Pachmarhi, where it amounts to 81·5 inches. Three-fourths of the annual total is received in the monsoon months of June, July and August, and a further nine to ten inches in September and October. Isolated falls may be received in November and December, while in January and February slight storms may occur, especially in the north.

2. PROVINCIAL INCOME

GOVERNMENT OF THE CENTRAL

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue	265	255	238	226	221	233
Excise	105	126	131	150	157	135
Stamps	50	58	67	68	71	61
Forests	41	47	51	52	50	53
Other heads	16	9	10	10	8	9
Irrigation	—3	2	2	1	1	2
Debt Services—Interest ..	4	8	5	3	3	3
Civil Administration—						
Administration of Justice ..	4	5	5	6	7	6
Jails and Convict Settlements .	2	2	2	3	3	4
Police	..	3	2	2	1	1
Education	2	3	4	5	5	5
Medical	..	1	1	1	1	½
Public Health	1	1	1	1	1	½
Agriculture (including Co-operation and Veterinary) ..	2	3	3	3	3	3
Industries	..	..	..	..	..	..
Other departments ..	2	..	1	1	..	½
Civil Works	4	4	5	4	5	5
Miscellaneous	8	11	11	12	9	8
Miscellaneous adjustments between Central and Provincial Governments	..	..	..	..	2	..
Extraordinary receipts ..	..	..	..	..	..	½
Total, Revenue Receipts ..	503	538	539	548	548	530

AND EXPENDITURE.

PROVINCES AND BERAR

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue	38	45	46	24	25	27
Forests	28	30	31	33	35	40½
Other heads	12	12	15	12	25	22
Capital outlay on Forests charged to Revenue	..	..	..	..	2½	..
Irrigation—Revenue Account ..	21	22	24	26	25½	27½
Irrigation—Capital Account charged to Revenue ..	19	12	..	..	2	1½
Debt Services—Interest ..	4	4	3	2	2	..
Civil Administration—						
General Administration ..	50	50	48	68	69	70
Administration of Justice ..	31½	32	31	31	32	32½
Jails and Convict Settlements ..	11	9	10	9	9	10
Police	58	57	57	58	58	60
Education	49	54	49	50	53	62
Medical	13	14	14	12	14	17
Public Health	5	4	2½	3	5	4
Agriculture (including Co-operation and Veterinary) ..	14	13	14	15	16	16
Industries	3	6	3	2	3	3
Other departments	2	2	1	2	2	1
Civil Works	65½	63½	68	65	76½	102
Miscellaneous	72	60	77½	76	78	78½
Provincial contribution ..	31	22	22	22	13	22
Miscellaneous adjustments between Central and Provincial Governments	..	½	..	1	..	½
Extraordinary charges ..	..	..	..	..	..	..
Total, Expenditure charged to Revenue ..	527	512	516	511	545½	597

GOVERNMENT OF THE CENTRAL

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Receipts						
Revenue Surplus	..	26	23	37	2½	..
Famine Insurance Fund ..	..	36	45	44	42	46
Appropriation for Reduction or Avoidance of Debt ..	..	..	1	2	..	..
Other appropriations ..	..	..	..	..	3	3
Loans and Advances by Provincial Government	37	57	33	23	12	7
Loans between Central and Provincial Governments ..	511	29	31	27	13	32
Total, Capital Receipts ..	548	148	133	133	72½	88
Opening Balance ..	−413	..	78	172	245	229
Total ..	135	148	211	305	317½	317

PROVINCES AND BERAR.

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Expenditure						
Revenue Deficit	24	..	..	..	..	67
Famine Insurance Fund ..	..	5	4	3	4½	10
Loans and Advances by Provincial Governments	91	5	3	2	21	7
Loans between Central and Provincial Governments	5	42	6	28	25	8
Forest Capital Outlay	..	1	1	1	11	7½
Capital Outlay on Stationery and Printing	..	..	2	..	..	..
Construction of Irrigation Works..	15	17	23	26	27	26
Miscellaneous	..	..	..	..	..	4½
Total, Capital Expenditure ..	135	70	39	60	88½	130
Closing Balance ..	..	78	172	245	229	187
Total ..	135	148	211	305	317½	317

3. REVENUE ADMINISTRATION AND LAND RECORDS.

The combined provinces are divided into five divisions, each under a Commissioner, and twenty-two districts, each under a Deputy Commissioner. The districts are divided again into tahsils, of which there are 83. Each tahsil is divided for purposes of land records into *patwari's* circles which comprise several villages, and are grouped into three or four revenue inspector's circles per tahsil. Revenue inspectors are supervised by assistant superintendents of land records under a district superintendent of land records who is under the Deputy Commissioner. The head of the Land Records Department is the Director who is also Commissioner of Settlements.

The Deputy Commissioner is the official head of his district, the district representatives of other departments being for the most part his advisers in matters concerning their departments, and corresponding through him, so that he watches over and co-ordinates all government activities in his district and safeguards the interests of the general public. He is, amongst other duties, in charge of the administration of revenue law and the maintenance of land records, and must give constant attention to the state of the crops, the economic condition of the people, the need for remissions or suspensions of land revenue and to any symptoms of approaching scarcity. The forests in his district are under his general control. He was formerly largely responsible for the maintenance and planning of roads, the spread of education, the general public health of the district, and the prevention and stamping out of cattle disease. But latterly these duties have been handed over to representative local bodies and his responsibilities have to this extent been reduced.

The organisation of a suitable land revenue system in the tracts which are now included in the combined provinces was a task of unusual difficulty. Prior to the advent of the British administration, the chief characteristic of the system, or lack of system, was the ruthless rackrenting which swept aside any existing rights and customs which stood in the way of the demand of the rulers of the time. Villages were farmed out to the highest bidder; the cultivator held no security; no rights of occupancy were recognised, and hereditary rights were not admitted, although, in practice, land often passed from father to son so long as the rent was paid. But fresh engagements were made from year to year and the previous tenant was ousted if he were outbid. In the Nagpur country, engagements for the government demand were taken from the village *patels* at the beginning of the agricultural year, but the amount for which they were to be responsible was not fixed or announced to them until sufficient time had elapsed for the character of the season to become apparent. No trace of fixed assessment or even assessment rates existed, and the demand from the village constantly fluctuated. As the *patel* did not know what sum he had to collect, each field was given a rent-paying value, or *ain*, and the demand, when known, was distributed over fields according to their *ain* value. In Chhattisgarh, the revenue-paying capacity was measured not by the field but by the

plough, and any inequality of assessment was corrected by increasing or diminishing the area of holdings. A first instalment of revenue was collected based upon the demand of the previous year; then, later, when the character of the crop was determined, a second demand was made. As most villages had four kinds of soil, and these kinds were scattered, it was considered necessary for each "plough" unit, to have samples of each soil in proper proportion. Thus a "plough" consisted of a great number of small, often tiny, plots scattered all over the village. Where the distribution of the land amongst "ploughs" was found to have become uneven, owing either to increase of cultivation or increase of cultivators, there was a system of *lakhabatta* whereby the inequalities were re-adjusted. The excessive fragmentation of holdings in Chhattisgarh is largely due to these causes.

The British found that the poverty of the people and the precarious condition of their agriculture precluded anything more permanent than yearly settlements until information was gathered on which longer contracts could be based. But as conditions became more determined, it became possible to extend the periods. The position of the *patel vis-à-vis* the cultivators or ryots was the subject of long consideration, and in 1868 the Government of India agreed to a proposal to accept the *patel* as *malguzar* with proprietary rights, subject to various restrictions on his right of transfer and also to the recording and maintaining of the rights of the cultivators or ryots. The latter thereby declined to the position of tenants of the *patel*, and subsequent legislation has been aimed at protecting their rights in the land. The result is a somewhat complicated series of tenures, with legal restrictions on ejectment, enhancement of rent, acquisition of new rights, and power of transfer. The major portion of the land is cultivated by tenants whose rent can only be enhanced at settlement and once, under certain conditions, during the currency of a settlement which is ordinarily in force for thirty years, and who are exempt from ejectment so long as they pay this rent.

In the cotton tract the average holding is about thirteen acres, in the rice tract it is seven acres and in the wheat tract nine. But this does not represent the actual area cultivated per cultivator, as brothers may share in one holding, and the same man may cultivate in more than one holding in his own and neighbouring villages.

In Berar, the system is different: eighty-eight per cent of the area is held directly from Government. The greater proportion of the ryots have full rights of occupancy, transfer and alienation, subject to payment of the revenue. The land revenue system of Berar is founded on that of Bombay.

4. THE CULTIVATOR.

The Central Provinces and Berar, while in area the sixth, is in population the seventh in order amongst the provinces of India. The total is nearly fourteen millions, and the density, while considerably greater than that of Australia or America, is much less than in the more populous parts of India, Egypt or Japan. The mean density, 122 persons per square mile, is the lowest in British India, except Burma. The cotton

tract is the heaviest, and the plateau division, the lightest in density. The density of population approximates to that of the less developed parts of southern Europe. Generally, there is every variety of caste and tribe mixed up together. Repeated incidence of widespread scarcity, following upon failure of the rains and the influenza epidemic in 1918, have retarded the increases of population which were recorded last century, and the effect has been enhanced by emigration due to the attraction of labour to the coal mines, the Tata works at Jamshedpur, the Assam tea gardens, etc.

No less than ninety-one per cent of the population live in villages, of which there are 47,576, the average distance between each being less than two miles. The cultivator very rarely lives on his fields or outside the *abadi* or site for dwelling places; but sometimes, as a result of the caste system or of congestion, small hamlets are formed which may be some distance away from the main village. Every cultivator has a right to receive house space free of charge from the head of the village, and it is only where non-agriculturists and traders are found that house sites attain any value. Most villages are small, their average population varying from 227 in the plateau to 399 in the Maratha plain.

Nearly five-sixths of the population are Hindus. There is a large number of Animists, the line between whom and the Hindus is not well defined. The two million members of the Animist community are almost confined to jungle tribes who venerate different deities at different times. They form one of the more serious problems before the administration.

Of the total population, over three million are forest or hill tribes, of which the most important are the Ghonds who now are mostly engaged in cultivation; the next largest group is one of hereditary cultivators, numbering less than three millions. The chief caste is the Kunbi, who with the Kurmi and the Kolta are the traditional tillers of the soil. Nearly a million persons are recorded as graziers and dairymen, amongst whom the Ahirs are the most numerous. The care of cattle and the sale of milk is their chief occupation. Other large sections are the weavers and leather workers. The principal landholding caste in the Central Provinces is that of the Rajputs.

Over 74 per cent of the whole population are occupied in agriculture, the next in order being industries (9 per cent) and commerce (5·6 per cent). Women work freely, there being 812 females for every 1,000 males amongst workers; they are employed in almost every occupation. In agriculture, they are employed as field labourers, cultivators and farm servants; there are actually more women workers than men in all mines except coal, in cotton spinning, in the small rope and wool industries, food industries, grain grinding, lime burning, stone cutting and dressing, and in labour on roads and bridges. In all occupations, the proportion of dependents to workers is 42 to 58. Of the total population, the proportions of males and females under fifteen years is 42·6 and 40·6 respectively, so that practically every person over fifteen is recorded as a worker.

The province possesses three sharply divided classes of rent receivers, rent payers and labourers, very few in any one of these classes appearing amongst the others. Similarly, very few of the rent receivers have any other source of income; very few engaged in other labour follow agriculture as a secondary occupation, and even the graziers do not practise agriculture; generally, the hereditary occupations keep distinct even from others closely akin to them.

There does not appear to be any shortage of labour for the type of agriculture in vogue, but, on the other hand, there are large portions of the province in which the *kharif* crop, which is reaped at the end of the rains, is the only crop of importance that is grown, and, when this crop is harvested, there is a scarcity of employment until shortly before the break of the next monsoon. The heavy seasonal demand, such as occurs at the time of cotton picking in Berar or in the north by the wheat harvest, is met by a corresponding movement of labour.

The simple needs of the ordinary villager require a blacksmith and a carpenter, who may sometimes be combined in one person, for their agricultural implements, a potter to supply them with inexpensive earthenware, and a shoemaker. In many parts, the blacksmith and carpenter are still village servants paid by a grain cess at the time of harvest, and there is always a supply of shoes and pots to be obtained within a few miles of the village at the weekly bazaars. Cottage industries are not important and have great difficulty in competing with the machine-made products. Weaving is universal and has recently received a temporary impetus from the movement in favour of country cloth or *khadi*. Silk-bordered weaving attains a high standard of efficiency.

One of the most striking things about the ordinary village is the scarcity of shops of any kind. The vast majority of the inhabitants depend upon the weekly bazaar for the supply of any commodity which they do not grow or make themselves. Few villages are situated more than eight miles from a bazaar village, and as each bazaar supplies the petty needs of all the villages for which it caters, it is self-contained and does not compete with neighbouring bazaars, but one dealer has a circuit and travels round from bazaar to bazaar, the days for which permit of arrangement of a tour. As a rule, transactions are in cash, but, where, as in the case of cloth, credit is sometimes allowed, payments may be made in grain. The village bazaars do not act as collecting centres for produce except in so far as payment is made in grain. There are more important centres where the cultivator may purchase cattle, sell grain, cotton or timber, or make his larger purchases of cloth. There are usually several cattle markets in each district which are held weekly, and during the more important religious festivals.

Although 74 per cent of the population are shown as dependent on agriculture, only 47 per cent are cultivators, the remaining 27 per cent being farm servants or labourers. Of the 6,600,000 cultivators, only 2,850,000 are usually regarded as cultivators by caste, the rest being jungle and hill tribes, etc. It is dangerous to attempt a picture of the "average" cultivator, but it may be said that he lives in a village with about 300

other people in sixty houses. Half of these houses will be found inhabited by cultivators. The net cultivated area will be round about 500 acres, or about ten to thirteen acres for each male cultivator over twenty years of age. For the work of tillage, he will have a pair of oxen. He is surrounded by other villages, there being nearly 400 of these to every town. He is far from a metalled road, and usually several miles from the nearest bazaar. Thus, except in the cotton tract, he tends to produce for his own consumption and sells enough to pay his land revenue, which is about fourteen annas per cultivated acre per annum.

He lives free from the strain of congested districts. He could, if pressed, cultivate 56 per cent of the province, but finds 34 per cent ample for his needs. There are large tracts which could be cultivated with profit if there were any pressure on the food supply; he is not yet faced with the law of diminishing returns. He does little double cropping and avoids intensive cultivation. His methods are primitive; he employs little capital; in many villages he has no field work to do between the end of the *kharif* harvest in one year and the beginning of the monsoon in the next. He is illiterate, and prefers his boy's labour to his education; in his defence, he can plead that there is only one primary school for eleven villages, and distances are apt to be too far to send a boy every day. He is almost entirely dependent upon the monsoon, and has bitter experience of the cruel scarcity that befalls when the rains fail.

5. THE AGRICULTURAL DEPARTMENT.

The first movement towards improving the agriculture of the province began with the attempt to introduce exotic cottons in the years following the American Civil War. The effort ended in failure, although traces of the work are still in evidence in the distinct percentage of Upland Georgian cotton which persists in the cotton mixtures of the Wardha district. The farm which had been opened at Wardha was closed down in 1872 and a "model farm" was established at Nagpur. In 1882, this farm gave place to the Nagpur "experimental farm" under the control of the Land Records and Settlement Department. The activities of the farm, however, aroused no general interest, and, during the next twenty years or more, attempts at development were confined mainly to the setting up of various classes of instruction in agriculture at the farm school. It may seem strange, in the light of subsequent experience, that any attempt should have been made to initiate classes of instruction in the total absence of expert teachers and before all but the veriest beginning had been made in the application of modern scientific methods to Indian agriculture; yet the school was not without effect in that it turned out men with a smattering of agricultural knowledge, however inaccurate, who became the assistants of the subsequently recruited technical officers.

The construction of the department, as it exists today, began in 1905 with the recruitment of a technical deputy director. The old farm class gave way to the Agricultural College in 1906, and by 1907 the expert

staff had been strengthened by the addition of a second deputy director, a principal of the college, a chemist and a botanist; and five experimental farms had been opened. A review of the whole organisation in 1910 led to the creation of a Provincial Agricultural Service and to the division of the Subordinate Service into two cadres, an upper and a lower. A third deputy director was recruited in 1913 and a new and well equipped research institute was opened in 1915.

Unfortunately, just at the stage when a rapid advance might confidently have been expected, the war broke out and progress, if it did not stand still, at any rate received a very marked check. Four officers were released for military duty and the general control of the recently created Provincial Service devolved for some time on one officer only for the whole province. Not only so, but two of the officers took up appointments in other countries after demobilisation. Both were men who could ill be spared, but the loss of one, in particular, was the more unfortunate in that it left the province for a number of critical years without the services of a fully qualified economic botanist.

With the close of the war came rapid expansion both of the personnel and of the activities of the department. The expert staff at the beginning of 1928 consisted of eleven officers.

The province is divided for administrative purposes into four circles, each in charge of a deputy director, while one circle has a subdivision under an assistant director, thus making practically five circles. The headquarters staff consists of the principal of the college, the agricultural chemist, two economic botanists, a mycologist and a deputy director in charge of animal husbandry. The post of agricultural engineer is at present vacant, the former incumbent having resigned. The Provincial Service cadre has sixteen posts, nine of which are connected with district work under the deputy directors and seven are in connection with research and teaching under the specialist officers. The Subordinate Service has seventy-one posts in the Upper Division cadre and sixty-four in the Lower Division. These men are employed as farm and assistant farm managers, in district work, and as assistants in the teaching and research sections. Below the Subordinate Service is a grade of vernacular speaking men of the status of superior ploughmen called *jamadars* and *kamdars*, who number in all 148. The strength considered necessary in the Provincial Service and in the grades subordinate to it has not yet been attained and expansion will doubtless take place as funds permit.

The activities of the department may be dealt with under the following heads :—

(*a*) Research and investigation.
(*b*) Demonstration and propaganda.
(*c*) Livestock improvement.
(*d*) Agricultural education.

(*a*) *Research and Investigation.*—Research is carried out at the Research Institute and the experimental farms connected with it—the College farm

and the Akola farm under the principal of the college and the economic botanist respectively; at the five experimental farms under the deputy directors of agriculture; and, to a limited extent also, at most of the thirteen so-called seed and demonstration farms in the charge of deputy directors. For a long period in its history, central research was handicapped by the lack of suitable laboratory accommodation and of staff. The necessary buildings and equipment were provided only in 1915, and shortly afterwards the only two specialist officers then on the cadre went on war service. The other specialists, the deputy director in charge of animal husbandry, the mycologist, the second botanist and the engineer were not recruited till after the war and their work is only now beginning to bear fruit, while the entomological section is a minor one in the charge of a single assistant of the Provincial Service grade, much of whose time is taken up with teaching duties in the college.

The investigation of cotton was taken up by Dr. Clouston more than twenty years ago and the common mixture of cottons known as *jari* was isolated into the six common types of cotton prevalent. The testing of these resulted in the separation of *roseum*, the characteristics of which are a short coarse staple, a high ginning percentage and a high yield. The distribution of this variety on a large scale has been a subject for criticism but the fact remains that it is still the most paying cotton which the cultivator, whose land is free of wilt, can grow.

Another of the earlier examples of selections is found in the *juars*, two varieties of which, selected very early in the history of the department, still stand out as the best in common use. Similar work on rice in the north and east of the province has produced several varieties of paddy which are now generally grown in these areas; and the work on wheat has left a distinct mark on the character of the crop grown in the north of the province. Early work on sugarcane led to the isolation of the hardy *khari* variety which has practically entirely replaced all the other local varieties. Of late years, the products of the Coimbatore cane-breeding station have also been under comparative tests on different farms of the province and there is little doubt but that *khari* will shortly give way to some of the new varieties.

The field work connected with the research of the specialist officers is done on portions of the college farm set apart for the purpose, and besides this the first botanist now has the Akola experimental farm under his direct control. Plant breeding by the botanical section was taken in hand seriously in 1921, chief attention being paid to cotton, groundnut and *juar*. The earlier attempts to improve cotton were, as we have seen, successful in the direction of selection for high yield rather than in improving the staple. The Indian Cotton Committee's Report, however, had pointed to the advisability of devoting more attention to the problem of finding a variety with a better staple and it is to the solving of this problem that the main efforts of the first botanist have been directed since 1923. The work is being assisted by the funds of the Indian Central Cotton Committee. The aim is to find a cotton which will give an

improved staple without at the same time losing its economic advantage by reason of low ginning percentage and low or uncertain yield. The problem is by no means an easy one, complicated as it is by the conditions under which cotton is grown—the short growing season and the general absence of irrigation facilities. The improved cotton, when it comes to be given out, will find a strong competitor in the short staple, hardy, high yielding *roseum* which at present holds the field. Nevertheless, it is understood that promising strains have been isolated and are now being grown on a field scale. The rest of the activities of the first botanist and his staff are concerned with crops which form a suitable rotation in the cotton tract.

A second botanist was appointed in 1925. His research operations deal mainly with the breeding of local wheats and pulses, and he has begun an investigation into the fodder and grass problems of the province.

The mycological section came into existence at the end of 1920. Active work began with the appointment of the present officer in charge in 1922. The principal research work in hand is a study of cotton wilt financed by the Indian Central Cotton Committee and investigation has been made into *juar* smut. The causes leading up to loss by foot-rot in wheat have been examined, and various other crop diseases are under investigation.

A great deal of the work of the chemical section is in the nature of team work with other branches of the department. The section is steadily carrying out a full analysis of the soils typical of different parts of the province and different crops. Recently an investigation has been made into the formation and loss of nitrates in the soil and this work will form an interesting complement to similar work in process in other provinces.

Such time as the entomological assistant has at his disposal for research work has been devoted to the problems of the sugarcane-borer, the cotton boll-worm, cotton leaf caterpillar, pests affecting rice, *juar*, and various fruit trees.

The engineering section was started in 1920. Much work in connection with implements had previously been done by the deputy directors and the principal of the college, the most outstanding result from which is to be seen in the large numbers of improved ploughs, manufactured by British and Indian firms, which have come into use in the province, especially during the past half dozen years. Types suitable to each tract now find a ready demand. Among machines, the most successful introduction has been the three-roller cane-crushing mill manufactured in the Punjab, and water-lifts from the same province are beginning to make their appearance. Since the engineering section was formed, the design of simple implements capable of being manufactured locally has received attention, and the engineer, in collaboration with the principal of the college, has carried out detailed trials of tractors and small power plant suitable for use on the larger holdings. An important function in the engineer's section is the class of instruction in tractors

and oil engines held every year, for the benefit of the sons or servants of such agriculturists as own these plants.

It is unnecessary to go into details of the investigations which have led to improvements in the methods of growing the staple crops. Such problems as seed rates, spacing, sowing methods, the character of cultivation best suited to different crops under different conditions, the limitations within which deep ploughing is advisable, water requirements, etc., have all received attention on the experimental farms. One of the most difficult problems to solve is the question of manure. It has been satisfactorily met as regards sugarcane and the more valuable garden crops, but the manuring of dry wheat has been found to be impracticable except through another crop or by means of leguminous rotations. The benefits of green-manuring on paddy land have been proved, but the difficulty remains of applying the system in the peculiar conditions of the paddy tract. Top dressing of cotton with artificials has given good results with the superior cultivation practised on government farms, but whether it will pay under the cultivator's field conditions and under the downward tendency of cotton prices remains to be proved. Steps have been taken for the better conservation of such farmyard manure as remains for agriculture after the requirements for fuel have been met.

(*b*) *Demonstration and Propaganda.*—The organisation by which the results of research are brought to the notice of the cultivator is under the control of the deputy directors. At present, each circle is divided into two sub-circles each under the charge of a Provincial Service officer, and consisting generally of two or more revenue districts. Under the Provincial Service officer, are a number of agricultural assistants belonging to the Subordinate Service ; when numbers permit, the aim is to have one such assistant for each tahsil. In general, each assistant is given one year's training or more on a farm, after completing his college course, before he is entrusted with district work.

The main centre of interest in the circle is the experimental farm which is under the direct control of the deputy director. The staff generally consists of a superintendent, a couple or more of trained assistants and one or more assistants under training (all members of the Subordinate Service). In addition, there is the farm clerk and the menial staff. Part of the farm is devoted to detailed experimental work which consists of the investigation of local cultivating problems, the testing of varieties selected or bred on the farm or imported from outside the circle or province, the trial of new varieties from the botanical section or of a particular variety which the mycologist or entomologist wishes to try out with reference to immunity to disease ; or it may be that a manurial problem is being worked out in collaboration with the chemist. The rest of the farm is taken up with trials, on a field scale, of the results emerging from the detailed experimental work. These trials determine the suitability of a particular variety or a particular method of cultivation for inclusion in the general agricultural practice of areas which are similar in conditions of soil, rainfall and temperature to the conditions existing on the farm.

A circle is a big area, however, and it does not follow that a variety or method which has proved suitable on the experimental farm will prove of equal merit elsewhere. To provide for this, seed and demonstration farms have been established, at least one of which is located in each sub-circle under the general supervision of the Provincial Service officer in charge of the sub-circle, and in the immediate charge of an experienced agricultural assistant. The object of these farms is to test the experimental farm varieties as regards their suitability to local conditions and, when that has been established, to produce seed for distribution. Another important function they discharge is the stocking of implements, machines and manures suitable for the tract, financed by a permanent advance from Government for the purpose. They are supposed to be purely commercial in character but they do not differ in any marked respect from the less intensive experimental portion of the headquarters farm. For this and other reasons it is not always possible to run them on a paying basis.

All the seed grown on the experimental or seed farms, except that of discarded varieties, is handed over to the agricultural assistants engaged in district work for distribution for sowing. Their business it is to bring it to the notice of the cultivator and to persuade him to adopt it. Comparatively few cultivators except those within a narrow radius of the experimental and seed farms ever take the trouble to come and see for themselves and so improvements have to be demonstrated at their doors and at fairs and festivals where they congregate. The demonstrator assistant's life is a strenuous one ; he tours from twenty to twenty-five days in the month the whole year round, according to a programme laid down by his superior officer. His activities vary according to the season. When he is concerned mainly with implements he organises ploughing matches, he carries a plough about with him, works it for a day or two in a village, collects orders and passes on to another village. For seed distribution he depends largely on the private grower to whom he supplies fresh seed from the government farm on condition that the grower will do his best to keep it pure and will sell as much of it as he can to his neighbours for sowing. When he is concerned with a complicated demonstration of a new crop or a new method, a plot is leased for him for a period of five years or less and put in charge of a resident *jamadar* ; if the demonstration is a simple one he carries it out on the cultivator's own fields.

The purely departmental propaganda agency is supplemented by various non-official agencies. Chief among those, leaving aside the individual seed growers already mentioned, are the district and tahsil or taluk agricultural associations. Under a scheme recently put into operation in the north of the province, these associations are financed by Government to enable them to purchase a stock of seed from approved seed farmers. This they lend out to the members of the association on twenty per cent interest, *i.e.*, on the return of the lent seed stock and twenty per cent added at harvest. From the new stock the association repays, each year, ten per cent of the original capital advanced by Government

and ten per cent interest on the balance of capital still outstanding. The rest of the seed is lent out to members on the same terms the following year. After the scheme has been in operation for ten years, the association will thus have repaid the government advances in full and will have in its possession seed stock equal to the value of the original loan, plus an additional reserve, on account of the diminishing interest charges, which it will be able to cash and utilize for other forms of agricultural improvement. In Berar, several taluk associations have taken up implement as well as seed distribution, maintaining their own implement stores from which ploughs and machines are sold or given out on hire. Smaller organisations than those of the tahsil or taluk are the unions of seed growers who supply improved seed to the public, and the circle and village associations, all concerned mainly with seed distribution.

Although several successful associations are in existence there are many others which have failed to be of any great practical utility, and even the best of them are indebted for their success more to the efforts of a few individuals rather than to the joint efforts of the members. Perhaps the reason for this may lie in the method of their development. The district associations were the first to be formed, then the tahsil. Originally, membership was built up by the haphazard selection of the bigger men without very close regard to their interest in agriculture ; of late the tendency has been to develop the smaller unit, the revenue inspector's circle association, with the intention of building up the tahsil association by election of representatives from the lower unit, and the district associations in like manner from the tahsil associations.

It remains now to consider to what extent the activities of the department are reflected in the agricultural practice of the province. There is no detailed information as to the total areas on which seed originating from government sources is sown, but the published figures show that in 1926-27 private seed farms, of which there were 8,770, supplied over eight thousand five hundred tons of improved seed of the ordinary staple crops. It was estimated that half a million acres were under improved cotton, 135,000 under wheat and 104,000 under paddy. These figures must be regarded as approximations only, for the department has no means of ascertaining accurately the areas sown from the natural spread of seed issued in previous years. As an indication of the probable accuracy of the estimates, it may be noted that, in the wheat tract, the sample now being offered in the principal markets is about ninety per cent pure compared with sixty to sixty-five per cent pure ten years ago, and a hybrid wheat issued to the public in 1923 is coming into the market in sufficient quantities for commercial purposes and separate shipment, and has already acquired a trade name. Other examples of definite progress are the introduction of groundnut which was practically unknown in the province fifteen years ago and which extended to over 44,000 acres in 1926 ; the almost complete replacement of the old varieties of sugarcane by an improved indigenous variety, and the introduction from Nagpur into the north of the province of a variety of sesamum which is now in general cultivation there.

Better cultivation in all tracts has followed on the extension of the use of the inversion plough. In the cotton and wheat tracts its value in cleaning the land is widely recognised and even small cultivators come forward to hire the use of a tractor when unable to do the work with their own bullocks. Ploughing in Berar a dozen years ago was a matter of rare occurrence; now it is coming into general practice. In 1925-26, when the cotton crop was poor and the prices low, between four and five thousand ploughs were sold and in each of the two previous years, when better economic conditions prevailed, the sales approximated 8,000. A three-roller iron cane-crushing mill has replaced the old inefficient wooden mill and an improved type of *gur*-boiling furnace has been adopted which requires no fuel except that which the crop itself provides.

Examples of better methods of technique are to be found in the adoption of line-sowing in the north of the province in place of the former universal system of broadcasting all *kharif* crops, the substitution of the single or double seedling practice in the transplanted rice areas in place of bunches of eight or ten, and the prevention of smut in *juar* by treating the seed with copper salts.

Estimates of the financial advantages which have attended the efforts of the department must be largely speculative for, though it is possible to gauge them with tolerable accuracy on a carefully managed government farm, it does not follow that the same results are obtained on an indifferently cultivated private holding. The departmental estimate puts the extra value of improved wheat and paddy seed at five rupees an acre, *roseum* cotton at seven to ten rupees, sugarcane at thirty to fifty rupees. To the profit resulting from planting the improved cane has to be added the economy effected by the substitution of the new type of *gur* furnace as well as the higher yield from better cultivation and manuring. Improved methods must have had their effect in raising the profits from other crops as well but these are more difficult to compute.

(*c*) *Livestock Improvement.*—The province carries a population of approximately twelve million head of cattle and buffaloes, chiefly the former. Other kinds of livestock are relatively unimportant; the indigenous pony is comparatively worthless, so worthless that attempts to improve it have been abandoned; goats and sheep are bred in fair numbers by the professional shepherd castes, the former for food, for milk, which Muhammadans and low-caste Hindus drink, and for offerings to the deities, and the latter principally for their wool. Buffaloes are kept mainly for dairy purposes; male buffaloes are not used for draught except in the rice tracts, which absorb the young male stock bred in other parts of the province.

Except in one or two localities, for example the home of the Gaolao breed in Chhindwara district and part of Wardha district, the indigenous breeds are of very poor quality. The popular belief is that the quality is steadily deteriorating and that the deterioration is due to the expansion of cultivation and the consequent contraction of the areas available for grazing. If this is true, it is true only in a small degree for the cattle are at their best in the cotton tract where grazing is scarcest. The real reason appears

to be that economic considerations affect the cattle policy of the ordinary cultivator only to a very small extent, if at all. He does not, as does the farmer in western countries, take stock of the food resources of his holding and limit the number of his herd accordingly. Every animal that is born into his herd is allowed to live on, irrespective of whether it is likely to be of any economic value or not; similarly, when a cow ceases to produce calves or milk or when a bullock is past work, it is allowed to linger on in the herd, eating up the food which is all too scanty for the proper maintenance of the more useful animals. The cultivator's main argument for maintaining large numbers is that they provide him with manure, but he forgets that the total amount of manure produced is governed entirely by the amount of food available, and that a given amount of food will produce as much manure when eaten by a smaller number of well-nourished animals as it will when divided among a larger number of under-nourished ones. The results are seen at their very worst in the Chhattisgarh division where every village owns a large herd of miserable looking, undersized animals which produces only a fraction of the number of bullocks required for cultivation, and whose only other main economic use is the production of fuel and of the small proportion of the dung reserved for manure. Apart from rice straw and perhaps a little grain for the bullocks at busy working seasons, the cattle depend for their livelihood upon what they pick up on the common grazing grounds and rice *bunds*. From August till January they fare well enough, but they are in a state of semi-starvation right through the hot weather and large numbers fall a prey to disease. Conditions are somewhat better in the wheat country, and very much better in the cotton-*juar* tract where the limited grazing necessitates stall feeding with *juar* and cotton-seed.

Cattle improvement has not kept pace with the other activities of the department although breeding herds began to be established as long ago as 1901. The slow progress has been ascribed, in part, to the fact that these herds were in the charge of deputy directors already overburdened with other work and unable to give that close attention which breeding work demands. Other factors which retarded progress were the difficulty experienced in settling down to a definite comprehensive policy, and the very restricted scale on which operations have been, and even now are being, carried out. The general problem before the department was, firstly, to improve such pure or approximately pure breeds as existed; secondly, to improve the nondescript stock of such areas as possessed no particular breed; and, thirdly, to introduce better milking qualities into the pure and mixed breeds alike. Where work has proceeded with a single definite aim in view, a measure of success has been attained. One example is the pure bred Gaolao herd at Garhi which is being improved in the direction of draught qualities alone, another the Malvi herd at Powarkhera with the same objective, and a third the Montgomery herd at Telinkheri, the object of which is to provide a breed which will increase the milk supply in urban areas. Less success has apparently attended efforts in the direction of evolving a dual purpose animal. On several farms, an attempt has been made to achieve it by breeding pure Montgomery bulls

on to the local stock, a policy which, while it certainly improves the milking capacity of the female does not so certainly improve the draught qualities of the male. Two more attempts at arriving at the dual purpose animal are represented by the Malvi-Montgomery herd at Adhartal where cross-breds will be mated with cross-breds and the college dairy herd where a more intricate hybrid is being evolved, namely a cross which is to be half Montgomery, quarter Ayrshire and quarter Hansi. Here again cross-breds will be mated to cross-breds. Both of the last named herds are purely experimental and the work has not yet reached a stage at which its ultimate value can be estimated. No attempt has yet been made to improve the milking capacity of the cattle of the Chhattisgarh division. The local cows have been crossed with pure Malvi bulls with the object of producing a better draught animal. The resulting first cross was an improvement on the local cattle as regards size and bone but the country is too poor to maintain a big animal such as would result from further use of pure Malvi blood, and the second generation of crosses bred to crosses are no bigger than the original Chhattisgarhi animal.

The scale on which operations are being conducted is sufficiently indicated by the fact that the most important cattle farm in the province carries a stock of only sixty cows of breeding age, and that none of the remaining ten farms are capable of carrying more than thirty cows. The total number of breeding bulls of all kinds which the department issued from all its farms in 1926-27 was sixty-three, a number of these being cross-breds of doubtful ultimate value. The merits of the bulls apart, however, it is obvious that at this rate of progress many years must elapse before any general improvement can be effected. That the local Government is alive to the needs of the situation is shown by the appointment, in 1923, of a whole-time officer for cattle breeding and by the schemes for rapid extension which are now maturing. Proposals are under consideration for the transference or extension of some of the present breeding farms to larger areas, for the provision of two forest areas each of which will support a large herd of selected local cows to be graded up by the use of pure-bred bulls, and for the conversion of certain of the existing small breeding farms into sale depôts. Till the stock on the proposed large breeding areas reaches the requisite standard of purity, the males will go on to the market as bullocks, while the bulls from the already established pure-bred herds will continue to be utilized for meeting the demands of the existing "premium bull" scheme. When a condition of sufficient purity is reached in the grade herds, it is hoped that it will be possible to put out three hundred bulls per year and that number will make it possible to concentrate on the improvement of the cattle population, area by area, as is now done in the Punjab.

The fodder problem is almost more difficult than the breeding one. A number of new fodders have been tried, of which the best is *berseem*, but it can be grown only under irrigation and seed is both expensive and difficult to provide for large areas. Heavy yielding fodder sorghums have been isolated and their cultivation extended and efforts have been made,

by the introduction of fodder-cutters, to make the existing supplies go further. Attempts are being made to encourage the preservation of monsoon fodders and grasses in the form of ensilage, and experimental work in connection with the improving of grass lands has recently been started.

(*d*) *Agricultural Education.*—The first attempt at imparting instruction in agriculture began in 1886 with the establishing of a two-year course of study at the Nagpur farm, its main object being the training of subordinate revenue officials. A normal class for village schoolmasters was undertaken in 1899 and was subsequently abandoned, and a like fate overtook a vernacular one-year course intended for the sons of influential landholders which was in existence between 1901 and 1910.

With the general movement on the part of the Government of India in 1904 towards the improvement of agriculture, the need for a higher and more scientific course than that given in the original farm class became apparent, and the old class was replaced by the college in 1906. The original college course was one of three years, the entrance standard being the university matriculation. After sundry changes the college settled down in 1921 to two courses, one of four years' duration leading to the college diploma and the other of two years leading to the college certificate. The former was steadily developed so that, in 1925, it was able to be affiliated, with but a few minor changes, to the Nagpur University as a B.Sc. degree course. The two-year course still continues.

In the degree course, instruction is given in agriculture, surveying, mathematics and English. The first elements of the sciences bearing on agriculture are introduced towards the end of the first year and increasing attention is devoted to those in subsequent years. A feature of the second year is the amount of attention given to practical agriculture. A block of ten to twelve acres of the college farm is worked co-operatively by the students under the supervision of an assistant, and the profits of cultivation go into their own pockets. In the third and fourth years, mathematics and English are discontinued. Training in field experiment work is given to the third year class, and the fourth year students are each allotted a simple subject for investigation on which they are required to produce a thesis.

The two years' course concerns itself mainly with practical agriculture. Except that direct science is almost entirely omitted, it follows, on the whole, the lines of the first two years of the degree course and includes, in addition, first aid, carpentry and blacksmithy.

The college also gives short courses in animal husbandry and dairying.

Since 1916, the certificate has been awarded alike to men taking the two years' and the four years' course on the results of the intermediate examination at the end of the second year, and only those who have attained a first class certificate have been allowed to proceed further.

The college is strictly residential; the hostel provides accommodation for 115 students and is fully occupied. Candidates for admission

require to be of good physique, they must belong to families directly connected with agriculture, and they must be reasonably well educated. In the past, the better educated students have been attracted more to professions like law and medicine than to agriculture, and even a degree in arts is held to confer a social status superior to that of the licentiate of an unattached college. Now that a degree course has been established, a higher standard among the candidates for admission may be hoped for.

Service in the Agricultural Department is still the goal most desired. A few of the four-year men are recruited annually to the Upper Subordinate Service, and some of the two-year men find posts in the lower cadre. A few are given appointments in the agricultural departments of other provinces, some are managing private estates and some have gone back to manage their own land. It is unlikely, however, that the expansion of the provincial departments will keep pace with the output of qualified men, and more and more of them will be forced to adopt agriculture as a profession.

Certain attempts have been made to meet the demand that definite agricultural instruction should be imparted in rural schools. The most important of these was the opening of two schools in the year 1918-19, one in the wheat tract and the other in the rice tract. These schools were originally designed with the idea of taking, from the upper standards of the middle school, sons of cultivators who in normal conditions would, on leaving the middle school, return to their land and of giving them a finishing education largely agricultural but including some general education on lines applicable to their profession. At first, there seemed to be a future for these schools and with the aid of a vast amount of propaganda a certain number of boys came forward, but attendance soon fell away and interest declined. The school in the rice tract is now closed. The one in the wheat tract has been gradually changed from a vocational to a pre-vocational school and is now, to all intents, a vernacular middle school, taking boys from the fifth to the eighth standard, and providing a course which replaces elementary science, drawing and history by agriculture and surveying and gives the boys two hours' practical work per day on the farm. In this form, it shows signs of proving popular among the better class cultivators and landowners in its locality.

Finally, an attempt has been made to give the pupils of an ordinary rural vernacular middle school three or four hours a week in practical agriculture on a departmental demonstration plot near the school. This simple form is about to be extended, where possible, in co-operation with the Education Department.

6. THE VETERINARY DEPARTMENT.

The Veterinary Department was founded in 1901 when a Superintendent was appointed to work under the Director of Agriculture. The two departments have since been separated, and veterinary work is now under its own technical head. There is no college ; students from the veterinary colleges at Madras, Bombay and Lahore are recruited, and students from the provinces are given stipends from Government for training at the

Bombay college. The personnel of the department, in 1926-27, consisted of 2 superintendents, 6 deputy superintendents, 16 inspectors, and 131 veterinary assistant surgeons. The cadre is not full. There are dispensaries at all headquarters of districts and in most tahsils, making a total of 94, and 33 of the veterinary assistants are in charge of travelling dispensaries, visiting villages and rendering such aid as they can to the cattle there. The staff, although on the increase, is still insufficient for the work to be done, but the people are displaying more and more appreciation of the advice, and help available and the number of cases treated has increased eightfold in the last twenty years.

The incidence of contagious diseases is high, and the province suffers from the import of infected cattle from surrounding Indian States for sale at the various fairs; the local Government have power to exclude, from fairs, animals suffering from contagious diseases, but this hardly touches the main problem. There is not the staff required to detect and control disease-bearing herds, and little can be achieved without the co-operation of neighbouring States and provinces.

Castration work with the Burdizzo instrument is rapidly expanding, and should lead to considerable improvement in quality and a lower incidence of pasturing on overstocked forest and village lands. Cattle breeding is not undertaken by this department.

A central veterinary laboratory at Nagpur, which the department shares with the agricultural staff, performs useful functions in the correct diagnosis of disease from smears sent in by district officers. Nearly 20,000 cases were received in the last year reported on, and preventive measures are thereby facilitated. The staff have little time for research; a scheme for a properly equipped laboratory for research in local problems is under consideration.

7. IRRIGATION.

In the Report on the Administration of the Central Provinces for the year 1881-82, there appears the following item:—

"2. Canal Revenue.

7. There are no canals in the province."

Since that date, considerable development has taken place. The chief irrigation systems at the present time are: the Mahanadi Canal which draws its supplies from the Mahanadi river and the Maramsilli reservoir; the Tandula Canal which is fed by the reservoir at Adamabad; and the Wainganga Canal which takes off from the river of that name. These three systems, between them, supply water to about two-thirds of the area irrigated from government sources. In 1926-27, there was assessed a gross area of 423,040 acres, and realisations of revenue amounted to Rs. 12·91 lakhs. The change was forced on the administration by a succession of disastrous famines due either to a deficiency in rainfall or to the early cessation of the monsoon. Early schemes were rejected on the ground that they would prove financial failures; but the cost of famine relief in 1899-1900 amounted to nearly six crores of rupees altogether, and the need for irrigation works for

protection against the recurrence of similar disasters on a comparable scale was brought prominently to notice. Within the famine period, there was expended forty-five lakhs of rupees on the repair of private tanks and wells, and about five lakhs of rupees on the construction of eleven new government works; so that it may be said that the construction of State irrigation works began then. The Report of the Irrigation Commission of 1901-03 resulted in the adoption of a new policy.

Conditions for irrigation works in these provinces present greater difficulties than in some others. Although the rainfall is less subject to variation than in other parts of India, it is apt to be very unevenly distributed, especially during the latter months of the monsoon, when the time is critical for both *kharif* and *rabi* crops. The average annual rainfall over the provinces is about 41·5 inches; it varies from 30 inches in the Berar plains to 75 inches in the Pachmarhi hills.

A deficiency of twenty-five per cent is injurious to crops, while one of forty per cent leads to serious scarcity. In the critical month of September, a deficiency of twenty-five per cent occurred in 19 years out of the 33 preceding the sittings of the Irrigation Commission. The problem is to ensure a good crop by making up any deficiencies of rainfall in September and October. But when the rainfall is adequate, there is no demand for water; and even in bad seasons, the cultivators hope that rain may yet fall and spare them the expense of canal water. As hope fails, when already the crops have began to deteriorate, a sudden demand springs up; everyone wants water at the same time from channels designed to give it by rotation. The time involved in supplying the needs of the fields means delay for some and a consequent loss of revenue. Where a normal rainfall is sufficient to ripen a crop, a system of irrigation based upon a supply only where there is a demand is not suitable. To meet the difficulty, cultivators in each village are encouraged to enter into long-term agreements whereby payment is made whether water is actually taken or not, the rate being reduced for those who enter into the agreement. This system is proving successful and much facilitates the work of distribution. A further difficulty arising from the lack of water-courses from the government irrigation channels to each field can only be solved by the action of the cultivators themselves.

The scope for beneficial irrigation is less than might at first sight appear. Wheat is more likely to suffer from an excess of moisture than from drought; the black cotton soils have been regarded as unsuited for irrigation as they are apt to be too retentive of moisture, while large areas are on undulating ground. In other places, there is no source of supply even if the soil were suitable. The light upland soils do not require irrigation even if they could be commanded. The rice areas, however, offer prospects of success, and have, in consequence, received most attention. The Irrigation Commission recommended an expenditure of three crores of rupees in twenty years, which they estimated would suffice for the irrigation of 450,000 acres; actually, five-and-a-half crores have been expended and the average area irrigated in the last six years has been 423,330 acres. It

is expected that the schemes which have been completed or are at present under construction will eventually irrigate about 900,000 acres.

Rice is the main crop dealt with. Irrigation for *rabi* crops is not popular, and a reasonable rate for water for wheat seems to be only obtainable in a tract in the Saugor district. The new canals are designed only for rice irrigation.

From the above, it will be seen that the problems facing the administration are peculiarly difficult. Famines have been too frequent and too severe to permit of any neglect of measures that promise a remedy, but in between these years of scanty rainfall, there is little need for canal irrigation. Thus it became necessary to decide whether to irrigate a small area thoroughly and make this safe from the vagaries of the monsoon or whether to spread the irrigation over a much larger area, thus affording promise of enhanced prosperity in the normal majority of years but involving the risk of bad years. It was eventually decided to adopt the latter course ; it held out a prospect of greater benefit over a series of years and so seemed more likely to assist the people to resist a time of acute distress.

With a few minor exceptions, the works are not productive ; the highest figure for revenue has reached only 2·02 per cent on cost, and it is not expected that a return of 2 per cent will be exceeded for some years to come. On the other hand, the value of the works as a protection against scarcity in areas which have suffered from frequent failure of crops in the past and as a means of increasing the produce in normal years should be very great. In the report of an economic survey in Chhattisgarh made by Mr. J. C. McDougall, Deputy Director of Agriculture, it is related that in two groups of ten and seventeen villages irrigated by the Pindraon tank in the Raipur and the Khapri tank in the Drug district, the population increased between 1911 and 1921 by twenty per cent and forty-five per cent respectively, against an increase of only six per cent in the Raipur district as a whole and a decrease of four per cent in the Drug district. Although much has been accomplished under great difficulties, a very great deal more remains to be done before the provinces can be regarded as adequately protected against scarcity.

In the three rice-growing divisions of Chhattisgarh, Nagpur and Jubbulpore, the area under rice is about five million acres ; of this less than nine per cent is irrigated by private works, and about another nine per cent by government works. When those government works which are contemplated or under construction are completed, it is estimated that about eighteen per cent of this area will be irrigated from government works. The most precarious districts have little private irrigation, and therefore the more need for public canals. But in these districts, comprised in the Chhattisgarh division, the cultivators are said to be lazy and unenterprising ; they do not transplant the rice, and excessive fragmentation of holdings restricts progress. The need for new canals is acknowledged, but it is difficult to justify their construction until further experience is obtained of results from the Mahanadi Canal and of the willingness of the people to renew their agreements when the first period

has expired. Elsewhere, the soil where rice is grown is light, and, without manure, becomes exhausted to a point which permits of little benefit from irrigation. Thus, irrigation is not likely to secure full appreciation until the manure question is solved.

In other districts, the expansion of irrigation must wait upon the willingness of the people to enter into the agreements. With a sequence of good years, progress in this direction is apt to lag, while one year of short rainfall would considerably influence the rate of acceptance.

The obstacles to extension of irrigation are many: cost is high where storage has to be provided; the difficult nature of the country to be traversed adds to this; when a fair crop is obtainable in good years without irrigation, the people are naturally unwilling to pay for water which they can do without, and this leads to great uncertainty as to the financial results; the fact that irrigation is not wanted for the spring crop and so is confined to the autumn one, makes the maintenance expensive. The poor standard of cultivation necessitates low rates for water, while the shortage of manure detracts from the full benefit of irrigation. Thus, it cannot be said that there is undue delay in constructing new works and much must be done before better financial results can be expected. It is also worthy of mention that the economic position of the people has much improved since the Irrigation Commission made their inquiry, and the need for further irrigation is not so acute as it was. It seems practically impossible to devise a scheme that would be productive, so that the case for further irrigation depends upon the need for protection against famine. At present, the works just about pay running expenses without counting interest charges.

8. FORESTRY IN RELATION TO AGRICULTURE.

Government forests cover 19,677 square miles, or about twenty-four per cent of the total area of the province; in addition there are large areas of privately owned forests. It is the policy of Government to assist the agricultural classes by providing grazing facilities at rates which are purely nominal for small holders and which only approach the commercial value of the produce removed in the case of large herds.

Every genuine cultivator is allowed to graze four cattle for each working plough, at rates varying with the locality from one to three annas; thus a man with four cattle pays not more than one day's wage per year for grazing. If he possesses more cattle than allowed by the scale, he pays ordinary rates up to the limit prescribed for commercial rates. The value of the concession due to privileged rates is estimated at ten lakhs of rupees a year.

Of the total area under Government, only 3,164 square miles, or about one-fifth, is closed to grazing and even this is open to cutting; 3,921 square miles is open to all animals, and the remaining 12,488 square miles is open to all except browsers. The closures are arranged so as to preserve to the local population adequate facilities in areas conveniently situated, and care is taken to secure a separate scrutiny by the Revenue Department which consults the people affected. That the facilities are freely enjoyed

is indicated by the fact that while the total number of cattle, sheep and goats is about thirteen million, over three-and-a-half million are grazed in the forests. The average revenue realised is about six annas per head. The number of cattle on privileged rates is just below 1,900,000, while 973,012 pay higher rates.

In addition to facilities for grazing, the department is also attempting to place at the disposal of cattle owners the grass in areas closed to grazing. Experiments in the supply of baled grass for stall feeding were not successful owing to the absence of any demand, although the bales were offered at cost price. Licenses to cut grass at low rates are available but, except for thatching, little is removed in this way. The system of permitting contractors to purchase in auction the right to cut grass for sale is somewhat more popular in some tracts, and is being continued where the people display no preference in favour of cutting for themselves under license.

Bona fide agriculturists are permitted to take dry firewood, timber, etc., at special low rates, and attempts are made to supply the local demand from areas of forest adjoining. A scheme to place at the disposal of the people cheap firewood from fuel depôts at convenient centres in order to remove the need for burning cowdung has not met with encouraging results. The continuance of this immemorial custom with firewood stacked almost at the door suggests that it is not lack of firewood which robs the soil of valuable manure.

In other ways, every effort is made to meet the legitimate demand for forest produce, such as leaves, fruits, etc., and it is claimed with reason that the forests in these provinces are being worked primarily for the benefit of the agricultural population. Where land is suitable for cultivation, it is given up to agriculture, and in this way nearly 2,500 square miles have been disafforested in the last twenty years. Few, if any, areas remain which could better be devoted to crops. If there were any room for complaint it would be that grazing has been permitted to an extent which endangers the continuance of the source of supply, and attempts are being made to limit the number of animals by negotiating grazing settlements. As has been already intimated, low rates for cutting grass or for grass cut by contractors do not relieve the pressure.

There does not appear to be any present danger from erosion as a result of disafforestation; there is an old rule forbidding the cutting of trees within twenty yards of either bank of a stream.

9. GENERAL EDUCATION.

The task of combating illiteracy in the provinces presents much the same difficulties as are found elsewhere. The poorer classes refrain from sending their boys to school; of those who attend the infant class, few survive through the whole course, and, of those who pass through, a considerable number lapse into illiteracy. Between the census period 1911-21, the number of persons returned as literate increased from 521,187 to 661,553, or about 14,000 per annum. In the same period, the number of pupils of all grades increased from 289,157 to 333,303 or 44,146

in ten years. The departmental report for 1926-27 shows a total of 399,289 pupils, of whom 341,614 are in the primary stages. Of these latter, however, forty-six per cent are in the first or elementary class, and only 50,854 in the fourth class. The last figure may be taken as representing the annual addition to the literates of the province; if 15,000 be assumed to be required to cover loss from deaths, then there should be an annual increase of literates of nearly 36,000. Anything less than this must be largely due to the lapsing into illiteracy and this wastage is clearly considerable. "It is a fact" says the Census Report for 1911, "that many who go through the primary schools in youth lapse into complete illiteracy at a later age, this being specially the case in the cultivating classes, who have little stimulus to keep up their education after leaving school." In the Census Report for 1921, it is suggested that "the tendency to relapse into illiteracy which is very prevalent among the cultivating classes is, if anything, on the increase." The management of primary schools is mainly in the hands of local bodies, and of these, while some evince active interest, others are apathetic. Many of their teachers are untrained; their prospects are poor, and they have little inducement to exert themselves. The only remedy for the disparity between the numbers in the first class and those in the fourth, and also for irregular attendance, is compulsion wisely applied; but compulsion without courage in its application is apt to give an attendance not much better than in voluntary schools. On the whole, present experience of the application of compulsion in the 66 villages in which it is tried is encouraging. Where this is applied, education in the primary course is entirely free; elsewhere a very small fee is levied, but there is some expenditure on books. Unfortunately, such progress as has been gained has been more marked amongst those classes who are not engaged in agriculture. Most rural schools have garden plots, but these are apt to be too small; and although efforts are being made to introduce nature study, it is found extremely difficult to get satisfactory teachers in this subject.

Agriculture was tried as a subject for the matriculation but it was purely a text-book study and was found to be of no value and therefore omitted. Adult education is not regarded as of major importance.

From the foregoing it will be realised that, while progress is steady, it is not rapid. The aboriginal section of the population is as yet scarcely affected; the higher castes amongst the Hindus and the urban Muslims show satisfactory figures, but the predominantly cultivating classes are not taking readily to the opportunities offered by the 4,523 primary schools in the provinces. One remedy suggested is concentration on the more flourishing institutions. "Some schools" it is said "exist only in name to carry on a lingering existence. The continuance of these schools is a sheer waste of public money. Well established schools suffer from want of accommodation or equipment and a great deal of money is absorbed by these nominal schools which serve no good purpose." It is also said that the poor attendance is due to the withdrawal of the active intervention of government officials and the local self-government

bodies seem unable to find an adequate substitute for the influence exercised by the revenue officers.

The teacher question is not free from difficulty. The district councils unfortunately confirmed a large number of untrained teachers, with the result that no posts can be found for those who pass through the normal schools, and the yet further result that candidates for normal schools are falling in number.

10. CO-OPERATION.

The co-operative movement has not made such satisfactory progress in these provinces as in some others, and is at present undergoing a process of re-organisation and drastic pruning. It was inaugurated in 1904, and, as in other provinces, experience has to be gathered by the painful process of trial and error. From the start there seems to have been lacking faith and confidence in the ability of the cultivator class to manage their own societies, and in consequence the control was centralised to an extent not usual in India. The Provincial Bank was registered in December 1911 and soon came to occupy too large a part in the movement. The central banks gathered to themselves too much power and the village societies declined to the state of mere agencies, lacking that vigorous individuality which is born of responsibility. The concentration of reserves and fluid resources at the centre afforded opportunity for misunderstanding of the financial position. The considerable increases in the number of societies, from 3,727 in the beginning of 1918-19 to 4,885 at the end of 1919-20, placed a strain upon the financial resources which they were unable to bear. The difficulties were apparent in 1919 and warnings were issued; in the following year it became clear that the expansion in the number of societies had outstripped the growth of banking credit enjoyed by the provincial and central banks, and the standard of fluid resource fell below that recommended by the Maclagan Committee on Co-operation. By October 1920, in attempting to meet the heavy demands of new societies for extra capital, the Provincial Bank had exhausted its fluid resources held for the protection of the credit organisation as a whole and was no longer able to finance the central banks. The reserve fund had been used in ordinary business and was thus not available to perform its proper function; severe crop failure and consequent scarcity intensified the crisis and the breakdown of the whole movement was only averted by the grant of government help. This took the form of Rs. 19 lakhs as advances to members of co-operative societies for cultivation expenses, and Rs. 17 lakhs as a guarantee of the cash reserve to promote public confidence in the banks.* The latter served its purpose without being drawn upon to any considerable extent, and in several central banks there was more money offering than could be utilised. Since that date, efforts have been made to subject the whole fabric to detailed critical examination and to remove all elements of weakness. Unfortunately, however, the financial prosperity of the

**Vide* paragraph 6, Report of the Committee on Co-operative Societies in the Central Provinces, 1922.

provincial and central banks had distracted attention for too long from the internal workings of the village societies. Amongst these latter, sufficient teaching in the principles and objects of co-operation had not been given to members; the principle that the whole movement exists for the benefit of members of the primary societies was not that dominating factor in central bank policy which it ought to have been. The central banks proved unable to devote sufficient attention to the requirements of the village societies and came to regard them as little more than agencies through which their surplus funds could find employment. A series of bad seasons led to the accumulation of arrears of land revenue, rent and *taccavi*, which had to be paid before the instalments of the loans from co-operative banks. The strain proved too much for organisations never strong and never properly trained; many have collapsed and more are moribund. There has been a decrease in the number of societies and members; a large proportion are taking no new loans; nearly one-third are being retained merely for the purpose of securing repayment of old debts. It is expected that nearly 1,200 societies will have to be put into liquidation. The situation is better and the outlook more promising in Berar than in the Central Provinces, and it is hoped that new life may be instilled into the movement through the labours of officials and a devoted band of active and public-spirited gentlemen.

The total number of societies of all kinds, in 1926-27, was 4,124 with a membership of 140,644. Primary credit societies numbered 4,007. With sustained effort, it is hoped to bring more than half of these into a state of efficiency, and, with a hard lesson well-learned, the prospects for the movement should improve.

11. COMMUNICATIONS AND MARKETING.

Of the Central Provinces, it was said in 1861 that " of all the matters under the cognisance of this administration, road-making is the most ultimately important, the most immediately pressing, and yet the most backward. Of roads completely made there is not one." Since then, much progress has been made, more especially since 1900. The length of metalled roads, in 1926, was 4,629 miles, and of all kinds 8,398. A further large programme is in hand and will, it is hoped, prove of great value to the agricultural population. The need for expansion and development is admitted, and in particular some bridges over rivers even on the main lines of communication are still required. Financial considerations and the difficulty in securing local labour restrict progress. In times of acute scarcity, the latter difficulty is overcome, as road-making is often the only means of subsistence.

In 1861, the total milage of railway contemplated was 365 miles; in 1926, 2,535 miles were completed and there is a large programme of new construction urgently wanted for the further development of the province. The enormous benefit to the agriculture of the provinces is indicated by the great expansion of trade with other areas.

Hitherto, agricultural produce has not been brought to market or railhead in any considerable quantity by motors, and the type of road in existence is not suited to heavy lorry traffic. There will thus arise the choice between restricting the use of such lorries and the reconstruction of the main roads on more modern lines.

The cultivator with surplus produce to sell has usually a choice of methods. He may himself carry it to market or sell it to another cultivator who collects from several neighbours until he has a sufficiently big load. Or he may take it to the village *bania* in lieu of money or grain advanced; then there are itinerant purchasers who move from village to village, generally in the more distant areas, and sell what they have bought in district markets to bigger traders. In tracts of a more advanced character, the grower brings his crops to the big markets on the railway, or to the main central market at Nagpur.

At the big markets, where there is considerable competition, sales and purchases are effected through brokers and commission agents, and although the grower gets a better price he is subjected to a series of charges, each perhaps petty in itself but amounting to an appreciable tax on trade; moreover, he is apt to suffer from unfair deductions on the score of quality, or from a ring of brokers. The interests of the cultivators are not properly represented on the controlling authority, which, on the other hand, is apt to be drawn from the same classes as the brokers and commission agents. In order to secure for the grower a better chance of a fair price, the formation of co-operative sale societies is being attempted.

The Berar markets are better organised, and on paper at least they are well regulated. If the rules could be strictly enforced, the grower would be protected from much of the fraud which is prevalent. But the grower is apt to be ignorant of business methods and leans on the middleman, so that much in practice depends upon the extent to which the latter seeks to serve the cultivator's interest. The custom in some big markets is for the maximum daily rate to be settled by the purchasers, so that the grower is up against a settled fact from the start. In other places, the cotton is auctioned freely from the cart and here the grower usually gets a higher price.

There is considerable diversity about the weights and measures in use, and the grower suffers from his ignorance and from the keener wit of the purchaser. Standardisation, however, presents difficulties which are not easily surmountable.

12. LOCAL SELF-GOVERNMENT.

The Central Provinces and Berar are divided into five divisions, each under a Commissioner, and twenty-two districts each under charge of a Deputy Commissioner. For each district there is a district council (or district board in Berar) constituted originally under the Central Provinces Local Self-Government Act of 1883 and the Berar Rural Boards Law of 1885. A new Act was passed by the old provincial Legislative

Council in 1920, and was applied to Berar in 1922. The new elections are being held under this enactment, and all the districts in the province now have councils constituted under the new Act.

Each district is divided into groups of circles and for each group a local board is established, subject to the authority of the district council. A local board consists of representatives, one or more in number, elected for each circle, together with other persons, not being government officials or exceeding in number one-fourth of the local board, appointed by the Commissioner. The local Government may declare any local board to be an independent one, in which case it exercises within its own area, so far as may be, the functions of a district council. The qualifications vary according to the circumstances of the different parts of the province.

For district councils, the local boards elect from their own number two-thirds of the members prescribed by law; these select one-sixth from amongst persons resident in the district and qualified as voters. The remaining one-sixth are appointed by the Commissioner, and must not be government officials. No official may be a member of a district council unless elected chairman or vice-chairman by that body.

The main source of income is a cess at $6\frac{1}{4}$ per cent on the land revenue in the Central Provinces, and of 18 pies in the rupee on the assessment of each survey number in Berar. An additional cess may be imposed for educational purposes, and, on occupants of houses, buildings or lands, a special rate may be levied if the village benefits from any school maintained by the council within it. Certain other fees, tolls, taxes, and rates may be imposed. Unless they are indebted to Government, district councils may pass their own budgets; they usually devote their income to roads, hospitals, markets, water works, wells, management of fairs, supervision of sanitation and vaccination, the diffusion of education, and other measures of local utility calculated to promote the health, comfort or convenience of the public.

In important villages or groups of villages, village *panchayats* under the Central Provinces Village Sanitation and Public Management Act, 1920, or the Central Provinces Village Panchayat Act, 1920, may be constituted. The members are elected. Under the former Act, only sanitation is dealt with; under the latter, petty civil and criminal cases may be disposed of. The income is derived from a house tax. Little use has yet been made of these Acts; the Village Sanitation Act has been applied to 114 villages.

In the opinion of the local Government the district councils evince little interest in rural sanitation, veterinary dispensaries, or other rural matters, but lack of funds is ascribed as the reason. The principal object kept in view in framing the new Local Self-Government Act was to extend the functions and increase the sphere of usefulness of district councils by granting to them increased powers of taxation. With the exception of fees and tolls on markets, the councils do not appear to have made any adequate use of these new powers.

13. PUBLIC HEALTH AND SANITATION.

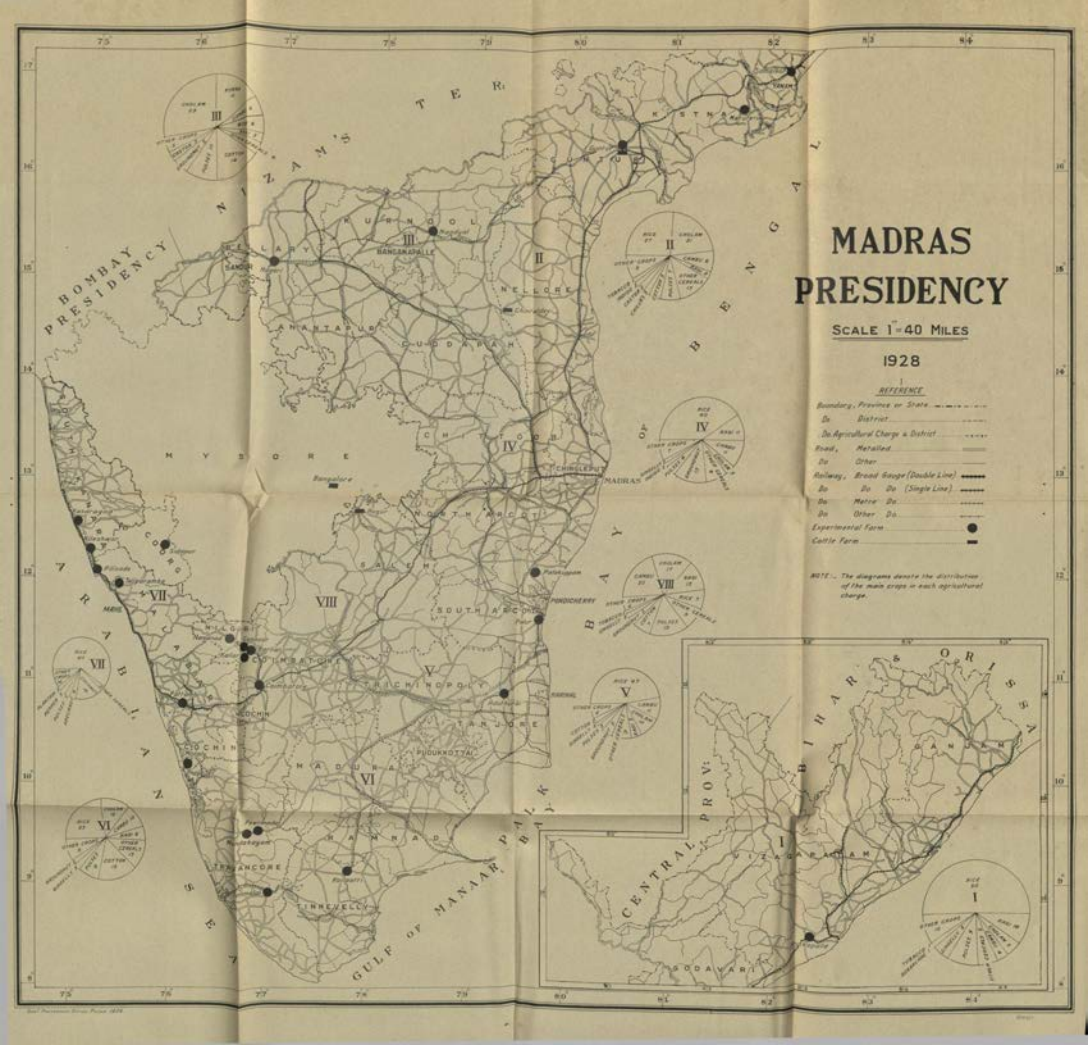
The province possesses the highest birth rate in British India and the second highest death rate. The latter is somewhat lower in rural areas than in towns, but it reflects the general ignorance of the people on sanitary matters. The province as a whole is intensely malarious and fevers account for fifty per cent of the deaths. Malaria is endemic in a very large part of the forest areas (which comprise a considerable proportion of the whole) and is markedly more fatal in rural areas than in urban.

The old Sanitary Board was replaced in 1910 by a Public Health Department with a Director, to which were added later an assistant director and a chief plague medical officer; but, unfortunately, the war and the financial stringency that followed have enforced severe restrictions on activity. There are thirty touring dispensaries under the charge of assistant medical officers, and there are two health publicity officers who tour with magic lanterns and give lectures.

An experiment is being made in the training of vaccinators in epidemiology in order to increase their usefulness and schoolmasters are being taught the technique of vaccination. Owing to the opposition to vaccination against small-pox that still occasionally appears in some areas, Government are considering the advisability of making this measure compulsory.

The touring dispensaries appear to be popular and afford relief to large numbers of sick; the lectures by the publicity officers are well attended and seem to be appreciated by the people. But until more funds are available, progress must be slow. Time is required before any visible effects on the health of the people can be expected. Health officers for the larger districts where the civil surgeons are too busy to do full justice to this part of their duties are needed; but lack of funds is the obstacle. Teachers are being trained in hygiene and use is made of rural schools to inculcate the elements of health.

There is a Village Sanitation Act which is applied to a few villages and funds are collected and spent on cleaning village sites, wells, etc. But no schemes of an extensive nature can be carried out.


MADRAS PRESIDENCY
SCALE 1"=40 MILES
1928
REFERENCE
Boundary, Province or State
Do District
Do Agricultural Charge & District
Road, Metalled
Do Other
Railway, Broad Gauge (Double Line)
Do Do Do (Single Line)
Do Metre Do
Do Other Do
Experimental Farm
Cattle Farm
NOTE:- The diagrams denote the distribution of the main crops in each agricultural charge.
BOMBAY PRESIDENCY
NIZAM'S TERR.
MYSORE
BAY OF BENGAL
ARABIAN SEA
GULF OF MANAAR
PALK BAY
BIHAR & ORISSA
CENTRAL PROVS.
NELLORE
CHINGLEPUT
MADRAS
SOUTH ARCOT
PONDICHERRY
TRICHINOPOLY
TANJORE
MADURA
COIMBATORE
COCHIN
TRAVANCORE
TINNEVELLY
GANJAM
VIZAGAPATAM
GODAVARI
I
II
III
IV
V
VI
VII
VIII

MADRAS

1. GENERAL FEATURES AND NATURAL DIVISIONS.

The Madras Presidency, together with the five Indian States which fall within its bounds, the State of Mysore, the small British province of Coorg, and the small French possessions (Pondicherry, Karikal, Yanam and Mahe) occupies the whole of the southern portion of the Indian peninsula. The west coast is washed by the Arabian Sea and the east by the Bay of Bengal. The northern boundary has been formed by the accidents of history and consists, from east to west, of Orissa, the Central Provinces, the State of Hyderabad and the southernmost districts of the Presidency of Bombay. The area of the presidency proper is 141,705 square miles, or 20,000 square miles more than the area of Great Britain and Ireland. Of its 90·5 million acres, 57·5 millions are classed as "culturable,' 13 millions are under forest, and 20 millions are 'barren and unculturable.' The culturable area, which is about 62 per cent of the total, includes a net cropped area of 33·26 million acres, the remainder consisting of cultivable waste and current fallows. Irrigation, from government and private sources, is available for slightly over 9 million acres and, if the new schemes sanctioned or under consideration are all executed, water will be provided for an additional 800,000 acres in the near future.

The presidency contains two well-defined hill systems. The Western Ghats run, steep and rugged and at an average elevation of 4,000 feet, in an all but unbroken chain along the whole length of the western coast, at a distance from the sea varying from 50 to 150 miles. Along the eastern coast, but further inland, runs the much less prominent and more broken range of the Eastern Ghats. These two systems converge, towards the south, to form the plateau of the Nilgiri Hills. To the north of this plateau lies an elevated table-land, from 1,000 to 3,000 feet above sea level, which includes the area bordering on the State of Mysore. Outliers from the two main chains are found in the Nallamalais of Kurnool district and in the Anaimalais of Coimbatore and Travancore. Besides these there are several isolated blocks of hills, the Shevaroys in Salem, the Panchamalais and Kollamalais in the same district and in Trichinopoly, and the Javadi Hills in North and South Arcot.

The key to the river system of the presidency is the conformation of its hills. The Western Ghats form an impregnable barrier to the passage of rivers in a westerly direction and there is, therefore, no drainage into the Arabian Sea, except that which is shed from their western slopes. With this exception, the whole trend of the drainage is from west to east into the Bay of Bengal. There are four great rivers, the Godavari, the Kistna, the Cauvery and the Pennar. The first two rise in the Bombay Presidency within fifty miles of the Arabian Sea, the third in the Western Ghats in Coorg and the fourth in the Mysore plateau. In the early part of their courses, these rivers flow rapidly in deep beds but the pace slows down as they approach the coast, and it

has, therefore, been possible to harness them all for irrigation purposes. The deltas are covered with wide expanses of irrigated crops which rarely fail, even in the severest droughts.

The presidency possesses 1,700 miles of coast line. The full advantage which such an extensive sea-board might be expected to confer is not secured for the reason that, in all its length, there is not a single natural harbour capable of accommodating ocean-going vessels. The various ports, except the Port of Madras which possesses an artificial harbour, are merely open roadsteads where ships can lie at anchor and discharge their cargo into small surf boats. The building of artificial harbours at Vizagapatam and Tuticorin on the east coast and at Cochin on the west coast is now under contemplation and these projects if carried out, will go far to provide all that is required in this connection.

The presidency falls into six natural divisions. The Agency division in the extreme north, which is a sparsely populated area, consists almost entirely of fever-stricken jungles and low hills covered with inferior forest growth and patches of bamboos. The higher portions are inhabited by aboriginal tribes such as Khonds, Savaras and Jathapas who depend upon sporadic or *podu* cultivation, while a few Oriyas and Telugus—the civilised races of the plains—occupy scattered areas in the lower portions in which they carry on fruit gardening and terrace cultivation, growing rice, gram, vegetables and other garden crops. Between the Agency and the coast, and extending to the south as far as the Nellore district lies the East Coast North division which includes the prosperous deltas of the Godavari and Kistna rivers. This tract is favoured with a fertile soil, adequate rainfall and extensive irrigation facilities. In the middle of the peninsula, which gets the full benefit of neither monsoon, is the Deccan division. Here Nature compels the peasants to work hard for a living. Their prosperity is almost immediately affected by even a small shortage of rain and the Deccan districts are seldom free, if not from the reality, at least from the apprehension of famine. Passing south from the Deccan, from the Telugu to the Tamil country, we come to the East Coast Central division, where the rainfall is more abundant, the soil more fertile and the peasants more industrious. The general air of prosperity which characterises this tract becomes still more evident in the East Coast South division which contains the densely populated deltas of the Cauvery and Tambraparni, and the cotton fields of the Madura and Tinnevelly districts. Finally, there is the West Coast division where the abundant rainfall enables a teeming population to extract a living from a soil not naturally over-fertile, with but little exertion.

It is not always realised how vastly conditions change in passing from one side of the presidency to the other, or from one end of it to the other. If we travel from east to west, as we pass through the famous gap near Coimbatore and reach the west coast, we come immediately into a different world, as different as, say, England is from Italy. We find a different race of people, referring to the Tamils we have left behind as "foreigners," a race with an entirely different language, with a different religion,

different customs, and different dress. Not only has the contour of the country changed from vast plains to rolling hills intersected by rivers and backwaters, but the climate has changed from a dry one to one of moist heat and frequent rains. The very type of village houses has changed and the temples are of a different design. On all sides, we find coconuts, pepper vines and areca palms, while the valleys are so fertile and well watered that, in some places, they yield three paddy crops in the year. Equally great and marked are the changes experienced as we pass from south to north and get into the Telugu country and find a different language and a different race of people.

The chief rain bearing current is the south-west monsoon which blows from the Indian Ocean from the end of May to the end of September. Much of the moisture conveyed by this current fails to cross the Western Ghats, with the result that the main precipitation (which may be anything from 100 to 180 inches) occurs between the top of the Ghats and the west coast. The districts on the other side of the range, except in a tract corresponding roughly to the Agencies in the north, generally speaking, receive less than 25 inches, and in many parts only 5 inches or less during the south-west monsoon period. The south-west current dies away in September and is replaced, normally in October, by the north-east monsoon current. The date of arrival of the latter is somewhat uncertain and it is often cyclonic in nature, sometimes coming with terrific force and causing considerable damage. The fall due to this is heaviest along the strip of coast lying between the Pulicat lake to the north of Madras city and Point Calimere in the Tanjore district. In this tract, the average rainfall is over 25 inches. The current gradually weakens as it passes inland towards the Eastern Ghats and in areas to the west of that range, such as the Deccan, the fall is less than 10 inches. Rain continues to fall at irregular intervals from January to May, the average precipitation during this period being about 6 inches. For the year as a whole, the heaviest fall in the presidency occurs on the west coast in the inland parts of South Kanara, where it is about 180 inches. The central and southern table-land comprising ten of the largest districts, gets, with exceptions, only a moderate rainfall, varying locally from 38 inches in North Arcot to 23 inches in Bellary. Moreover, it is in these areas where the rainfall is least abundant that it is most capricious both in amount and distribution and they are, therefore, the areas which are most susceptible to famine.

The climate throughout the plains of Madras is warm throughout the whole year, with a very varied humidity depending on the influence of the two monsoons. There is a general rise in temperature during February and March ; April and May are the hottest months ; from June till October, the climate is warm and humid in the regions of heavy precipitation from the south-west monsoon, but just outside this rain zone the humidity is lower and the temperature is modified by the wind. The eastern and south-eastern districts remain dry and hot during this period but, with the onset of the north-east monsoon at the end of October,

the situation improves. Generally, conditions are comparatively cool from November till the end of January. The climate of the Nilgiris and other high elevations is uniformly good. Cuddapah, where the mean temperature rises as high as 106° in May, is considerably the hottest station in the presidency.

The most general type of soil existing in Madras is derived from the gneisses and schists of the Archaean system and varies greatly in consistency, depth and fertility. In general, the upland soils are poor, thin, gravelly and light-coloured, and from these intermediate variations are found up to the rich, deep, dark-coloured loams of the lowlands. As a rule, the soils of this type are deficient in nitrogen, phosphates and humus, but potash and lime are sufficient. They respond readily to suitable manurial treatment, and irrigation can be employed with great advantage.

Black cotton soil covers extensive areas in the drier tracts of the presidency, in the Bellary, Cuddapah, Kurnool, Tinnevelly and Coimbatore districts and, to a less extent, elsewhere. This is a dark-coloured, often black, soil, probably derived from the ferruginous schists by weathering under arid conditions. It is exceedingly sticky when wet and difficult to work, but is very retentive of moisture and can yield excellent crops even where the rainfall is scanty. It is particularly suited to the cultivation of cotton and millets and possesses many of the cultural characters of the Deccan trap regions, though it never attains the depth of soil associated with the trap area. Phosphoric acid, nitrogen and organic matter are generally deficient but potash and lime are not. The larger rivers, the Godavari, Kistna and Cauvery, have formed extensive deltas consisting of deep, rich, alluvial loams, which produce heavy crops of rice under irrigation. They vary in character according to the nature of the upland soils from which they are derived, but all respond to manurial treatment, particularly in regard to nitrogen and phosphates. The soils of the areas of high rainfall are of lateritic origin and in this class can be included the ferruginous clay soils of the Nilgiris and other planting districts. These soils are the product of excessive weathering and are usually very deficient in potash, phosphates and lime and therefore respond readily to manuring. The almost complete absence of lime gives them an acid reaction.

The total area sown in 1926-27, including double cropped land, was 37·36 million acres. Of this, 29·35 million acres were under food crops and 8·01 millions under non-food crops. The most important cereal food crops were :

Rice	.. ..	10·8 million acres.
Cholam (*Andropogon sorghum*)	..	4·2 ,, ,,
Cumbu (*Pennisetum typhoideum*)	..	3·1 ,, ,,
Ragi (*Eleusine coracana*)	.. ..	2·3 ,, ,,

Of food crops other than cereals the most important were :

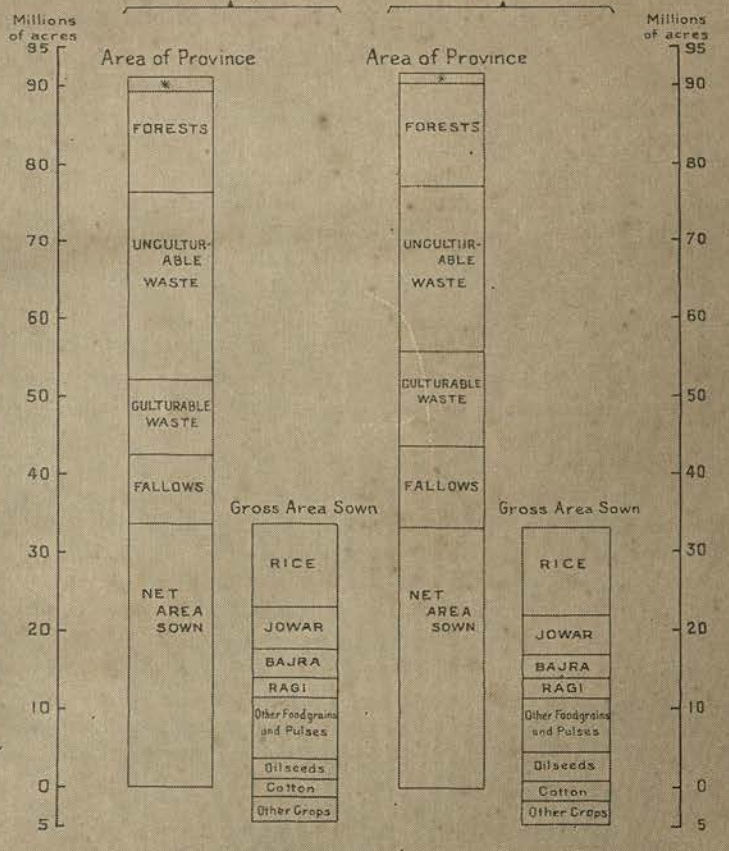
Pulses	.. ..	2·7 million acres.
Fruits and vegetables	.. ..	313,000 acres.
Sugarcane	.. ..	114,000 ,,

MADRAS

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 Year Averages)

NOTE: The difference between the Gross Area Sown & the Net Area Sown represents the area sown more than once.



* The areas marked with an asterisk represent the difference between the total area of the province according to the Professional Survey and the total area according to the Village Reports, the latter being the source from which this diagram was constructed.

To face page 222

The chief non-food crops were cotton (2·2 millions) and groundnut (2·7 millions). Smaller in extent, but yielding crops of high intrinsic value, was the area under "drugs and narcotics":

Tobacco	232,000 acres.
Arecanut (*Areca catechu*)	97,000 ,,
Coffee	51,000 ,,
Tea	55,000 ,,
Betel-vine (*Piper betel*)	27,000 ,,
Rubber	12,000 ,,

A quinquennial census of livestock is taken. The last four of these do not show any very definite increase in the number of cattle, especially if some allowance is made for understatement in the earlier reports. The figures were:—

1910	20·1 millions.
1915	21·8 ,,
1920	22·3 ,,
1925	22·1 ,,

At the last census the classification was:

Bullocks (including bulls) ..	7·3 millions.
Cows	5·5 ,,
Male buffaloes	1·4 ,,
She buffaloes	2·6 ,,
Young stock	5·3 ,,

In general, the cattle are poor in size and quality, though notable exceptions are to be found. There is, for example, the Ongole (Nellore) breed which provides the best milkers in the presidency and the males of which make good heavy-draught animals of a quality which will stand comparison with any in the world; there is the Allambady which is considered to be closely related to the famous Amrit Mahal of Mysore, and there is also the compact Kangayam which can trot up to seven miles an hour. The only other numerically important classes of stock are sheep (11·2 millions) and goats (8 millions). Horses, mules and donkeys are of little account and their numbers are on the decline.

2. PROVINCIAL INCOME

GOVERNMENT

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue .. .. (a)	726	730	(d) 714	740	(e) 771	754
Excise	488	490	519	490	494	510
Stamps	190	220	234	241	245	252
Forests	49	53	54	56	52	56
Other heads	(c) 36	36	48	39	43	45
Irrigation	(b) −27	−26	−25	−36	−35	−41
Debt—Interest	6	10	11	13	16	21
Civil Administration—						
Administration of Justice	11	16	16	14	12	13
Jails and Convict Settlements ..	9	8	6	8	9	8
Police	7	13	9	9	10	10
Education	7	7	7	6	6	7
Medical	3	3	4	4	4	5
Public Health	1	3	1	..	1	1
Agriculture (including Co-operation and Veterinary)	4	3	4	3	3	3
Industries	10	14	12	14	11	10
Other departments	3	3	5	4	4	4
Civil Works	7	8	7	6	10	8
Miscellaneous	11	12	13	15	18	17
Miscellaneous adjustments between Central and Provincial Governments	2	3	9	1	1	..
Extraordinary receipts	..	..	..	..	18	..
Total, Revenue Receipts ..	1543	1606	1648	1627	1693	1683

(a) Includes and (b) excludes land revenue due to irrigation.

(c) Excludes contra-adjustments under revenue and expenditure on account of income-tax which were

(d) The low actuals were due to adverse seasonal conditions.

(e) Includes a special credit of 13 lakhs for *ayacut* inclusion fees in the Kistna and West Godavari

(f) Excludes and (g) includes interest on irrigation works.

(h) Includes repayment of debt which was met from borrowed funds in the years 1921-22 to 1923-24.

AND EXPENDITURE

OF MADRAS

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue	129	133	41	38	39	39
Forests	52	48	47	43	48	50
Other heads	61 (f)	58	58	59	78	75
Irrigation—Revenue Account ..	40	35	39	40	47	50
Irrigation—Capital Account charged to Revenue	.. (g)	.. (h)	.. (h)	1	1	..
Debt Services	44	55	63	68	81	89
Civil Administration—						
General Administration	135	132	217	222	227	230
Administration of Justice	95	96	94	96	96	96
Jails and Convict Settlements ..	30	39	31	29	30	28
Police	200	204	201	196	188	188
Education	143	155	164	171	187	199
Medical	58	56	57	58	60	66
Public Health	27	11	12	32	33	31
Agriculture (including Co-operation and Veterinary)	26	27	27	27	30	32
Industries	21	18	16	18	17	18
Other departments	11	12	15	16	19	20
Civil Works	122	107	104	81	100	115
Miscellaneous	89	89	96	90	92	91
Provincial contribution	348 (c)	348	348	348	222	165
Miscellaneous adjustments between Central and Provincial Governments ..	21	..	..	1	..	..
Extraordinary charges	..	..	..	23	..	..
Total, Expenditure charged to Revenue ..	1652	1623	1629	1657	1595	1582

abolished with effect from 1922-23 by modification of Devolution Rule 15.

districts.

In the subsequent years the expenditure is met from ordinary revenues.

GOVERNMENT

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital and Debt Head Receipts						
Revenue Surplus	..	..	19	..	98	101
Famine Insurance Fund	..	6	7	5	7	8
Loans and Advances by Provincial Governments	16	37	22	22	38	34
Loans between Central and Provincial Governments	115	66	61	..	..	..
Advances from Provincial Loans Fund ..	..	..	..	130	89	202
Appropriation for Reduction or Avoidance of Debt	(a) 10	(a) 14	(a) 17	21	30	34
Suspense	..	..	..	..	2	7
Depreciation Funds	..	..	..	..	..	2
Total, Receipts ..	141	123	126	178	264	388
Opening Balance ..	59	..	9	13	31	144
Total ..	200	123	135	191	295	532

(a) Includes repayment of debt which was met from borrowed funds in the years 1921-22 to 1923-24.

OF MADRAS

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital and Debt Head Expenditure						
Revenue Deficit	109	17	..	30	..	..
Capital outlay on Forests	..	..	..	8	1	1
Construction of Irrigation Works ..	7	6	10	10	28	77
Civil works not charged to Revenue ..	11	..	4	6	9	7
Other Capital outlay not charged to Revenue	..	6	2	−6	2	14
Famine Insurance Fund	..	..	..	3	..	..
Loans and Advances by Provincial Governments	63	71	60	88	79	81
Loans between Central and Provincial Governments	10	14	46	21	30	34
Suspense	..	..	..	..	2	8
Depreciation Funds	..	..	..	..	..	..
Total, Disbursements ..	200	114	122	160	151	222
Closing Balance ..	..	9	13	31	144	310
Total ..	200	123	135	191	295	532

In the subsequent years the expenditure is met from ordinary revenues.

In 1921-22, as the result of famine, the non-co-operation movement and the Malabar Rebellion, there was a large decrease in revenue, while the same causes also led to increased expenditure, with the result that there was a deficit in that year of Rs. 109 lakhs. In 1922-23, the Government made every effort to balance the budget. Additional taxation was imposed under stamps and court-fees, registration fees were enhanced, and severe retrenchment in expenditure was undertaken. In the result, in the year 1922-23, the deficit was only Rs. 17 lakhs, which was turned in 1923-24 into a small surplus of Rs. 19 lakhs. The heavy floods and cyclone of 1924 again disturbed the financial position in 1924-25, but a remission of Rs. 126 lakhs in the provincial contribution saved the situation in 1925-26. A further sum of Rs. 57 lakhs was remitted in 1926-27. These remissions have enabled the Government to undertake a progressive policy of expanding elementary education by the opening of new schools, to incur additional expenditure on other development services and to build up a balance as a reserve against unforeseen contingencies.

3. REVENUE ADMINISTRATION AND LAND RECORDS.

The land revenue systems of British India have been broadly classified into two main divisions: *ryotwari* and *zamindari*. Both systems are in force in Madras, the former over about four-fifths of the presidency, and the latter in the permanently settled estates. Most of these estates are in the northern districts but large tracts are held under the *zamindari* tenure in some of the central and southern districts.

The *ryotwari* settlement is based on a cadastral survey, field by field, of the area to be settled. A separate map is prepared for each village, in which are shown the separate fields which make up the holding. In addition to the village map, each field is separately mapped and the subdivisions, if any, are shown. All these are bound up together to form an atlas known as the " Field Measurement Book ". Upon the basis of the cadastral map is prepared a ledger of holdings, the primary object of which is to show from whom the assessment of each holding or field or subdivision is to be realised, and the amount due in each case. The record is corrected every year at the annual settlement of accounts known as the *jamabandi*, when any changes in the holdings and any remissions under the rules are ascertained and recorded. The registered occupants of each field deals directly with Government and is entitled to hold the land so long as he pays the assessment. Subject to that provision he cannot be ejected by Government though he himself may increase or diminish his holding or entirely abandon it. There are no restrictions imposed by the legislature on inheritance, transfer, mortgage, sale and lease. A settlement ordinarily runs for a period of thirty years, after which a resettlement is effected.

The *zamindari* system differs from the *ryotwari* in two important respects: in the first place, the settlement is a permanent one; in the second, the revenue is imposed, not on each individual landholder, but on an individual (zamindar) owning an estate and occupying a position identical with, or analogous to, that of a landlord. The permanent

settlement was carried out without any detailed survey and record, and even now such a survey is only undertaken at the express wish of the zamindar. Government have bestowed upon the zamindar the right to collect the revenue on the condition that he hands over a certain portion of that revenue to the State. The amount payable to the State has been declared to be fixed and unchangeable for all time.

As regards the method by which the *ryotwari* settlement is carried out, the soils are divided into series, the most important of which are black (*regur*) and red ferruginous, and these again are divided into classes according to their chief constituents, clay, loam or sand. A further subdivision occurs according to quality and according to whether the land is 'wet', that is irrigated, or 'dry', land irrigated from purely private sources being classed and assessed as 'dry'. The outturns are then valued at a commutation rate which is below the average of the prices of the previous twenty non-famine years, and from this valuation deductions are made for differences between market and village prices, for vicissitudes of season, for unprofitable areas, and for cultivation expenses which are estimated according to soil. The balance represents the value of the net produce, of which one-half forms the nominal assessment. The rates thus obtained are then applied to the respective soils. Further allowances are made according to the position of groups of villages in relation to communications, markets, etc., and according to the nature of the sources which supply irrigation. In general, the existing classification of soils is not altered at a resettlement unless for very strong reasons.

In the period anterior to British rule, it was a favourite device, whilst leaving the land revenue nominally at a fixed proportion of the produce, to add to it very considerably by the addition of *abwabs* or cesses. The only cess that is now levied is the local rate, the proceeds of which are devoted to local objects such as roads, schools, dispensaries and sanitation and are administered by local boards. The amount of the cess is fixed at six-and-a-quarter per cent on the land revenue assessment *plus* water rate, if any, in the case of lands held direct from Government on *ryotwari* tenure, and on the annual rent payable to the landholder, in the case of lands held on any other tenure. In the case of *inam* lands or lands held wholly or partially free from assessment, the cess is levied on the full assessment *plus* water rate, if any, which such lands would bear, if they were not *inam*. In addition, district boards can levy an extra tax not exceeding three pies in the rupee, and the taluk boards can levy up to a similar amount. On the other hand, deductions from the full settlement rate are frequently allowed. There are, first of all, deductions which are of a permanent nature as in the case of *inam* and *muafi* lands. These are a legacy from the ancient custom of granting land either revenue-free or at a reduced revenue for religious or charitable purposes, or as a reward for service to the State, or as part of the emoluments of village officers and servants, and grants so made in the past were in general respected and continued. Again, all improvements, whether effected by the cultivator entirely from his own resources or with the help of a loan from Government, are exempted in perpetuity from assessment. Care is taken

that a proposed enhancement at a resettlement shall not press too heavily. The enhancement which may be imposed immediately is limited to twenty-five per cent, the balance being imposed by annual instalments not exceeding twelve-and-a-half on the original assessment and, if the enhancement is proposed on the basis of a rise in prices only, it must not exceed eighteen-and-three-quarters per cent. Finally, deductions are made by granting remissions of revenue in seasons of crop failure.

The assessment on wet land is wholly remitted if the land is left waste or the crop is totally lost owing to failure of water in the irrigation source, but suspension and remission of assessment on dry land are only granted in very exceptional circumstances, such as the occurrence of widespread calamities, such as famine, or of local calamities, such as floods or hail storms. Whether the assessment is suspended or remitted depends on the crop history of the tract in the years immediately preceding that in which the calamity occurs. Where remission is granted for loss of crop on dry lands, it is given at a uniform rate calculated with reference to the average loss for the whole of the affected tract. If the yield is one-sixth or less of the average, the remission is seventy-five to one hundred per cent ; if it is between one-third and one-sixth, the remission is from fifty to seventy-five per cent ; and if it is between one-half and one-third, the remission is from twenty-five to fifty per cent.

Remissions are not granted in the permanently settled tracts as their revenue is light.

Until twenty years ago, the relations between landlord and tenant, both in the permanently and temporarily settled tracts, were regulated by the provisions of an Act of 1865. Since 1908, the permanently settled parts of the province have come under the operation of the Madras Estates Land Act, based on the tenancy legislation of other provinces, more especially that of Bengal. Occupancy rights were conferred on ryots who, at the time, were in possession of land other than the private land of the proprietor. A non-occupancy ryot can obtain occupancy rights by the payment to the landlord of a premium equal to two-and-a-half times the annual rental. Rents can be increased by mutual agreement or by order of a revenue court, but the enhancement cannot exceed more than two annas in the rupee and the rent cannot again be enhanced for a period of twenty years. An occupancy tenant cannot be ejected for arrears of rent but his property (including movable property, with certain exceptions), can be attached and sold, in the proprietor's interest, by a properly empowered officer. In the *ryotwari* areas where the land is cultivated to a much larger extent by the landholders themselves and where, consequently, rents are far less prevalent, tenancy legislation has not so far been found necessary. The only provisions of the Estates Land Act which apply to these areas are those in regard to the recovery of rent. These give landholders in such areas the same powers in this respect as are possessed by landlords in the permanently settled areas.

We come now to a description of the agency by which the land revenue is collected and by which the records on which its collection is based are

maintained. The unit of administration is the village. Each village has an official headman. His primary duty is the collection of the revenue and to that are added the duties of petty magistrate and registrar of births and deaths. The other official of the village is the accountant or *karnam* whose office, like that of the headman, is hereditary in certain districts of the presidency. His duties are to keep the village account of revenue payments, to look after the village maps and registers and keep them up-to-date, to make inspections from which to fill up the statistical returns for which he is responsible, to maintain a record of all changes of ownership, and to report any unusual occurrences such as epidemics of human or animal disease. Both the village headman and the *karnam* are paid a fixed salary.

From the village we pass to the *firka*, the circle of the revenue inspector whose duty it is to supervise a number of *karnams*. Six or seven revenue inspectors' circles go to form a taluk, the officer in charge of which is known as the tahsildar. Under him there is an establishment for the purpose of receiving the local land revenue and sending it on to the district treasury, but revenue work by no means exhausts the list of his duties. Above the taluk comes the division under a divisional officer who is a member of the Indian Civil Service or the Provincial Civil Service. Above the division comes the district, the fundamental administrative unit, at the head of which is the Collector, and which contains on the average between six and seven thousand square miles and nearly two million inhabitants. The powers and duties of the Collector embrace almost every subject which comes within the functions of modern government. In fact, in the eyes of the cultivator, he is the supreme authority, the *ma bap* (literally, mother and father) who is expected to interest himself in all that affects the well-being of the people under his control. In all provinces except Madras, there is one more territorial unit—the division with the Commissioner at its head—but, in Madras, matters relating to revenue administration pass direct from Collectors to two of the three Members of the Board of Revenue or, in cases of special importance, to the Board as a whole. Finally, there is the Governor, his Executive Council and his Ministers.

4. THE CULTIVATOR.

The peoples of Madras belong almost entirely to the Dravidian race and therefore typify pre-Aryan India. Nevertheless there are great differences between them. The 1921 census distinguished some 120 castes, tribes, etc., of all degrees of civilization and enlightenment, from the Brahmins, the heirs to systems of religion and philosophy which were already old when the Romans invaded Britain, to the Khonds of the Agency tracts, who, within human memory, practised human sacrifice to ensure plentiful harvests. The striking similarity of the word 'rice', which came into the English language through Latin, to the Tamil word *arisi* gives some support to the claim that the original inhabitants of south Madras were the pioneers of rice cultivation. It may be claimed, with less uncertainty, that they were the pioneers of

irrigation engineering. The study of the crops and agricultural methods of the people of south India is for these reasons profoundly interesting and it is fitting that, within modern times, Madras, by its important deltaic irrigation schemes, should have shown the way to the utilisation of the vast resources of the Himalayan rivers which has changed the face of many an arid waste in northern India.

The Oriyas of the Ganjam and Vizagapatam districts in the north of the presidency who number 1·57 millions deserve special mention as a race of non-Dravidian origin. Their language resembles many other Indian vernaculars of Aryan descent, and the influence of Sanskrit on it is very marked. They came down as conquerors from the north in the sixth and seventh centuries A.D. and in the year 1434, under Kapileshwar Deva, one of the Ganga kings of the Solar line, spread as far south as the Pennar River. Relics of the sway of their rulers in the form of temples and large tracts of *inam* land are still to be found in the northern districts of the presidency.

The total population of the presidency, at the census of 1921, was 42,794,155 and of this seventy-one per cent were returned as making a living directly from agriculture. Tamils and Telugus between them made up 787 out of every thousand; the remainder consisted of Malayalees, Oriyas, Kanarese and Muhammadans. Of Hindus there were 887, of Muhammadans 67, and of Christians 32 per thousand. 124 in every 1,000 were urban dwellers; the remainder were distributed over 52,708 villages.

The census village, as a rule, is not a residential but rather an administrative unit. These units vary greatly in size from district to district. They are smallest in population in the Agency, where they contain, on the average, 116 souls and largest in population as well as in area on the west coast where the average population is as high as 1,344. They vary in type as greatly as they differ in size. Characteristic of the Agency is the "tiny temporary affair containing only a couple of huts and a cattle byre," which can be shifted elsewhere as occasion arises. Then there is the old fortified type, common in the Deccan, around which the ruins of the old walls and circular towers are still in evidence, and where the square, flat-roofed houses are crowded close together and the streets are narrow and tortuous. The ordinary village of the Tamil country will contain three or four broad streets, flanked by the tile-roofed, solid masonry houses of the well-to-do, behind or interspersed with which will cluster, in a shapeless mass, the mud houses of the poor. The west coast village, again, may cover a wide area in which each house, however humble, stands in its own compound amidst luxuriant vegetation. These are the characteristics which (in the words of the Census Officer) "give the whole of Malabar the appearance of a beautiful garden, where live a race of prosperous lotus eaters, each family nestling under its own pepper vine and jack tree."

In an average village, 810 out of every 1000 people would be engaged directly in agriculture; the remainder would be craftsmen, shopkeepers, village servants, etc. If every thousand of those supported by agri-

culture were divided by occupation, the result on the average would be as shown below :—

Non-cultivating landowners	.. 56
Cultivating do.	.. 398
Non-cultivating tenants	.. 32
Cultivating do.	.. 240
Farm servants and casual labourers ..	.. 274

The typical abode of the well-to-do cultivator is fairly commodious and is built of stone or brick and mortar. At the back of the compound are the thatched huts of the labourers and the cattle sheds. A distinguishing mark of the men of means is the large granary. The rich ryot never markets his produce immediately after harvest and never to the village trader, preferring rather to hold it over in the hope that prices will improve. The furnishings of his house are simple and inexpensive, consisting of a few benches and stools and desks, rudely fashioned by the village carpenter from wood grown on the holding. His fare, though simple, is markedly superior to that of his humbler brethren ; rice is his staple food ; millets rarely, except in the Deccan districts ; milk and milk products form an important item ; his garden supplies him with vegetables, supplemented by what he purchases at the weekly market. His wealth consists of his land, his livestock, his family jewels and the principal which he has lent out. He is no great believer in bank accounts ; moneylending and investment in land, in the order named, appeal to him much more. Socially, he aspires to connection with townspeople and, for that reason, marriage and other social obligations cost him dear. The dignity of manual labour does not appeal to him. His day's work consists of a walk of inspection round his fields after breakfast, and a second round in the evening when he gives instructions for the following day's work. He devotes his leisure mainly to law suits, to pilgrimages and visits to the towns. He holds a high position in the estimation of his fellows and is freely consulted in matters which concern their daily life.

The home of the cultivator who, though not in easy circumstances, lives well above the subsistence margin, is on a much less commodious scale. His granary is small for he has to part with most of his produce at harvest time. He is not encumbered with over-much furniture ; his friends, when they visit him, squat on a mat on the *pial* (verandah) ; his evening meal generally consists of rice, dal and vegetables, with fish or meat occasionally if he is not of a caste to which these are forbidden ; in the morning he breakfasts on what was left over from the evening before, or perhaps on *kanji* (millet gruel), vegetables and curd, and at midday he again has *kanji* ; milk products enter into his diet but sparingly ; his savings, if any, he invests much in the same way as does his wealthier brother ; his means do not encourage him to form marriage ties with the cities but nevertheless his expenditure under that head is heavier than he can really afford, and more than he would be inclined to incur if he were unfettered by caste obligations. He does his cultivation with the help of one or more permanent servants. After he has marketed his produce,

made his house watertight against the monsoon and given all the attention that he considers necessary to his holding, he has ample leisure before the business of the next cultivating season claims his attention.

The house of the poor cultivator who ekes out a bare subsistence consists of mud walls and a thatched roof and the same roof shelters his family and his cattle; furniture there is none; his cooking utensils are of earthenware instead of brass; he does not require a granary, for his chronic need of money compels him to sell his crops to the village merchant and moneylender even before he is in a position to sow them; he buys his clothing from itinerant vendors who refuse cash down if it is offered to them; millets form his staple food, rice rarely; milk and *ghi* are luxuries which he can seldom afford; his children are taken away from school at about eight years of age, to help on the holding or to tend the cattle of the village; in the slack season he plies his cart for hire if he has one; when conditions get too hard for him he emigrates, but with the firm intention of returning to his village as soon as he has made a little money.

The labourer, if he is a caste man, lives in the village proper, often in the compound of his master; if he is a member of the depressed classes he has to resort to the segregated area allotted to those classes. The casual labourer is generally paid in grain, at the rate of eight to ten annas a day for a man and four to six annas for a woman. The farm servant is paid in a variety of ways; a few rupees in cash *plus* a fixed quantity of grain, and clothing for himself and his family; or a definite share of the produce *plus* clothing. Generally he gets into his master's debt by taking an advance for a special purpose, such as a wedding, and nominally the loan is to be repaid by service. Cases are not unknown where the master takes care that the loan shall not be worked off, the man is attached compulsorily for life and sometimes his sons inherit the debt. Emigration to the rest of India, and to Burma, Ceylon and Malaya however, is steadily making its influence felt. Statistics show that while, in 1901, there were 270 working labourers for every 1,000 persons supported by the other agricultural occupations, the proportion in 1921 had fallen to 212, and that, between 1911 and 1921, the presidency had suffered a net loss of a million-and-a-half labourers by excess of emigration over immigration. This must mean that the labourers who stay at home are in greater demand and, in fact, wages show a continuous tendency to rise. Of late years, too, Government have started an organisation to deal specially with labour problems and, so far as may be possible, to improve the conditions under which the labourer works.

The villager enjoys little in the way of social amenities. His chief relaxation is to gather round the village tree and gossip, or to listen to recitals and religious discussions. Occasionally, the monotony is varied by the arrival of a travelling circus or cinema show, or by the exhortations of the officials of one or other of the departments which are concerned with showing him better ways of doing things. He is easily

satisfied, for his knowledge of the outer world is but scanty. The children are taught the " three R's " in the village school, or as much of the rudiments as they can pick up in two or three years, which is all the time that is usually devoted to school life by all except the children of the well-to-do. Their parents are illiterate, and in consequence they soon forget what little they have learnt. The position with regard to literacy is dealt with in the section on ' General Education.'

That Madras is a province of small holdings is clearly brought out by a study of the figures supplied by the First Member of the Board of Revenue, at page 304,* which refer to the *ryotwari* areas. Lands in these areas are held under *patta* (a document showing the area of land held under it and the revenue payable). A ' patta' may be in the name of a single individual or-jointly in the names of several. A man may hold more than one *patta* and a joint *pattadar* may in addition have a *patta* or *pattas* standing in his name alone. The total number of *pattas* is not, therefore, the same as the total number of holdings but the figures are sufficiently close to enable inferences to be drawn with some certainty from the figures of *pattas* as to the average size of a holding. The Tables show that the total number of single and joint *pattas* in 1925-26 was 5·4 millions. Over a million *pattas* paid, in revenue, Re. 1 or less ; nearly three million paid between Re. 1 and Rs. 10 ; and just under one million paid between Rs. 10 and Rs. 30. Thus, roughly, ninety-three per cent of the holdings pay Rs. 30 in revenue, or less ; and seventy-four per cent pay an amount not exceeding Rs. 10. Turning from terms of revenue payment to terms of the amount of land held by each of the three groups already mentioned, the average area of the land held under the *patta* which pays Re.1 or less is about two-thirds of an acre ; that held under the *patta* which pays between Re. 1 and Rs. 10 is just over three acres, and that of the third group is seven-and-two-thirds acres. In the light of these figures, there appears to be ample justification for the view expressed that many holdings have become subdivided to a point at which they no longer provide an adequate standard of living. Unfortunately, too, there appears to be clear evidence that subdivision is still proceeding apace in the fact that whereas, in 1921, the total number of single and joint *pattas* was 4,861,745, by 1926 the number had increased to 5,415,745. The position is rendered still worse by the prevailing system of fragmentation, under which an individual holding consists not of one compact block, but of a number of small plots scattered all over the village area. The experiment of re-arranging holdings by consent has been tried in Trichinopoly district, but without success. No attempt has yet been made to deal with the problem by means of legislation.

Recent censuses point to a steady increase in density of population and that in spite of the many diseases and other factors which at present take a heavy toll of human life. The question, therefore, obtrudes itself : How is Madras to accommodate the natural increase in the population of the future ? The progress of medical science and the preaching of the elementary principles of sanitation may be trusted to make the

* *Vide* Evidence Volume III—Madras.

toll taken by disease lighter and lighter as the years go by, so that an acceleration in the present rate of increase may be expected. Will a complete solution of the problem of the surplus population be found in emigration, in the expansion of industry, in bringing under cultivation the large areas which are described under the somewhat vague term 'culturable' but are not under crops, in increasing the productivity of the areas already under cultivation? When all these possibilities have been exhausted, the main solution will probably still have to be found in restriction of the population rather than in expansion of the material resources of the presidency.

Some idea of the extent to which indebtedness prevails is given in the Table on page 309.* As regards the four distinct areas in the Tanjore, Kistna and Godavari districts (for which the figures are more or less complete), it will be seen that, out of 3,740 cultivators examined in 125 villages, 1,697 were free from debt. The total debt in these four areas amounted to Rs. 27·8 lakhs, that is Rs. 1,360 per cultivator indebted, and Rs. 743 per head for the total number of cultivators examined. In two of the areas, debt incurred for "ordinary family expenses" has not been disentangled from debt incurred for purely productive purposes such as purchase and improvement of land and purchase of livestock and implements, but, in the other two areas, it would appear that forty to fifty per cent of the borrowings were for purposes which would not ordinarily be classed as productive. That marriage ceremonies are responsible for a large proportion of the unproductive debt is shown by the figures for nearly all the districts mentioned in the Table.

In a country of the size and diversity of the Madras Presidency, including, as it does, areas of copious rainfall as well as semi-arid tracts, fertile deltas and stony uplands, and cultivation at all altitudes from a few feet above sea level up to 7,000 feet, it is not unnatural that agricultural practices should vary very widely. How wide the range may be within the limits of a single crop can be seen from a glance at the methods by which the chief crop—rice—is grown. For instance, in areas irrigated from the Godavari, enough water is frequently available to mature a second crop, the area of second crop for which water is available being decided each year by the Collectors after consultation with the Irrigation Advisory Board. In the Kistna delta on the other hand, as in almost all the rice-growing areas in the northern part of the province, there is not enough water for a second crop and therefore the ryot grows a single crop of a late-maturing variety, followed by a pulse or a green-manure crop, the seed of which is broadcasted in the standing rice crop just before the latter is harvested. Again in the Cauvery delta, broadcasting is common, whereas, in the Godavari and the Kistna deltas, transplantation is the rule. In the Cauvery delta, where transplantation is practised, a variation from the ordinary method of managing nurseries is found in the 'double transplanting' system—a device rendered necessary by the generally late arrival of the north-east monsoon. The nurseries are sown in early September but the rains rarely appear before early November, by which time, under the ordinary method, the seedlings

* *Vide* Evidence Volume III—Madras.

would have tended to establish themselves too firmly in the nursery beds. They are, therefore, transferred to a second nursery bed where they remain until it is safe to plant them out. Another method known as *kar* and *ottadam* in the Cauvery delta and as *udu* in the Godavari delta, is the sowing of early and late-maturing varieties together, the seed being sown in the proportion of 2 early to 1 late. Under this system, when the early rice crop is harvested, the late variety is " topped " and the stubble of the early crop is left to rot and form a manure for the second crop. In the Agency division, where population is scanty and land plentiful, the outstanding feature is the prevalence of the practice of *podu* or shifting cultivation. A patch of jungle is set alight and the rice is simply broadcasted among the ashes, without any preparatory tillage or subsequent attention whatsoever. That particular patch is farmed until the land becomes exhausted. At harvest time, the whole of the straw is left standing, only the ears being cut off ; a few days before the next season's monsoon sets in, the straw is fired and the seed is broadcasted among the ashes as before. Still another system locally termed *kaipad* is practised in sour lands on the west coast. After ploughing, the soil is heaped up into small mounds. When the rain sets in, the injurious salts are washed out and sprouted seed is broadcasted over the mounds. When the seedlings are old enough to withstand acidity, the mounds are scattered and the seedlings take root and establish themselves uniformly. Shifting cultivation is practised here too, on the low hill ranges of Malabar, and is locally termed *modan* (hill-rice) cultivation. Finally, there is the " semi-dry " system which is practised in the alluvial tract of the Coromandel coast, as a precaution against the over-vigorous onset of the north-east monsoon. The seed is drilled in, as in the case of an ordinary dry crop, and frequent intercultivation is given. Then, from the time that the tanks fill right up to harvest time, it is treated as a wet crop.

A very efficient system of dry farming is practised in the Deccan districts, where the rainfall is scanty at best and uncertain always, and the water table is so low that irrigation from wells is not practicable. All crops are drill-sown and the efficacy of intercultivation in conserving moisture is very well understood. Every fifth year or so, the land is ploughed in February-March, with a heavy iron plough drawn by a team of six or more oxen, the object being to kill off *hariali* (*Cynodon dactylon*) and other deep-rooted weeds by exposure to the hot-weather sun. The ryots in these dry tracts are very good farmers and have little to learn about the handling of dry soils.

Mention may be made, too, of the diversity of the systems practised in the different hill regions. In the Anaimalais, the Shevaroys, the Palnis and the Wyannad, agriculture has become highly specialised and is practically entirely in the hands of the planters. In the Agency, there is, general agriculture and no planting, while in the Nilgiris both are practised.

Preparatory tillage begins about the middle of March. In some localities along the Ghats, showers received before the regular onset of

the south-west monsoon allow sowings to commence in May, but the bulk of the early monsoon crops are sown in the beginning of June, and of the late monsoon crops in October. Harvesting is over by the middle of January, when the ryot rests from his labours and indulges in the harvest feast or *pongal.*

The cultivator is by no means ignorant of the principles underlying the rotation of crops. He knows that certain crops exhaust the soil and that others have a recuperative effect and, when he can, he arranges his cropping accordingly. He is aware, for instance, that gingelly (*Sesamum indicum*) is a greedy feeder and therefore he follows it by a pulse crop, never by another crop of gingelly. Under wells in the Coimbatore district, a three course rotation of *cholam,* cotton and *ragi* is the rule. In the rice areas, a single crop of rice is followed by a pulse, or sometimes by *sann* hemp (*Crotalarica juncea*) or *dhaincha* (*Sesbania aculeata*) for fodder and green manure, or, when no other alternative is possible, late maturing varieties are followed by early varieties. Sugarcane, where grown, comes into the rotation once in every three or four years, and the same is the case with betel-vine and plantains (*Musa sapientum*). Where conditions are not favourable, and where holdings are small and subsistence farming the rule, regular rotations are replaced by a system of mixed cropping, or even by a combination of mixed cropping and rotation. Thus, a system common in the Deccan districts is to grow sorghum mixed with pulse and safflower (*Carthamus tinctorius*) and to follow those, the next year, by a mixture of *korra** (*Setaria italica*) and cotton. Elesewhere a cereal and a pulse are grown together, as, for instance, " dry " rice and red gram (*Cajanus indicus*), cholam and cowpea (*Vigna catiang*), *ragi* and field bean (*Dolichos lablab*); or shallow-rooted and deep-rooted crops like *korra* and cotton; or exhausting and recuperating crops like gingelly and red gram. The idea underlying the mixed crop system is that a season which is unfavourable to a cereal may be favourable to a pulse, and *vice versa.*

Of recent years, however, there has been a regrettable tendency to violate the old established rotations by a too persistent cropping with commercial crops like chillies (*Capsicum annuum*), tobacco and groundnut. The very intensive system of cultivation under wells in Coimbatore, for instance, has been upset by the introduction of Cambodia cotton (*G. Hirsutum*). This is a phase which may safely be left to work itself out when the diminishing yield and the increased susceptibility to disease, which must inevitably follow too frequent cropping with the same crop, react on the profits.

The above account will serve to indicate what a large number of variables are present in this huge presidency in soil, climate and agricultural practice and how difficult it is for the Agricultural Department adequately to cover such a large and varied area, with its language and caste difficulties and its widely different territorial customs. The Agricultural Department must not only cater for these different conditions but must also study them in detail. Any improvement discovered

* *Korra* is the Telegu name for this crop. The Tamil name is *tenai.*

in one locality under one set of conditions is not likely to prove equally good in another locality where an entirely different set of factors obtain. It is necessary, therefore, to establish experiment stations and plant breeding stations in each typical locality for the intensive study of crops under different conditions and, in an area so vast, it is difficult to lay down and start a sufficient number of such stations to cover the ground with thoroughness. The " range " of each station is limited and with the present facilities the " ranges " of the existing stations neither meet nor cover the whole ground. In these circumstances, the advice given by the Agricultural Department on many points can only be of a general and not of an intensive nature.

5. THE AGRICULTURAL DEPARTMENT.

The need for introducing an improved system of agriculture in Madras was recognised as long ago as 1854, although the Mutiny prevented active steps being taken until 1863. The first beginnings were not very sound in conception. Not unnaturally, it was thought that the quickest road to progress was the wholesale introduction of western ideas and methods. Hence the placing of an order in England for a " steam plough, some harrows and cultivators, seed drills and horse hoes, threshing machines and winnowers, chaff-cutters and water lifts. " Hence, too, the opening of a " model " farm at Saidapet on the outskirts of Madras city, at which the use of all these implements and machines, of artificial manures, and of western methods generally was to be taught to the ryots. The fundamental weakness of the scheme lay in the failure to recognise that an essential preliminary to model farming was the careful working out of the model to be followed and that model methods must, of necessity, be the fruit of an intimate knowledge of local conditions coupled with careful research and experiment on the multitude of problems which awaited solution. Nevertheless, the Saidapet farm continued to be the centre of agricultural activity for nearly forty years. For the first few years, it was controlled by a committee of management, with a superintendent in charge. In 1871, it was placed directly under the Board of Revenue and about the same time an assistant superintendent was added to the staff. Associated with its other activities was a class for the training of apprentices, with the object of fitting them to take charge of model farms and to act as demonstrators. Apparently this object was not achieved, for, when Government proposed to expand their activities by opening experimental farms in different parts of the presidency, the proposal fell through, mainly because there was no trained staff available to take charge of them. One result of this was that the problem of agricultural education came so much to the front that it obscured all the other equally important problems not only until an agricultural college was opened at Saidapet in 1876 under the control of the Education Department but for some years after. In 1885, an officer was appointed to the Board of Revenue as Commissioner of Revenue Settlement, Land Records and Agriculture. From that date the policy underwent a radical alteration. The Saidapet farm was abolished except for a small area

which remained attached to the college, and, up to the beginning of the present century, the energies of the department were devoted to the collection of statistics bearing on famines and to sporadic enquiries on agricultural or economic subjects in various parts of the presidency. Meanwhile, the "model farm" idea had been steadily retreating into the background in favour of the sound idea of establishing farms for experiment and enquiry, with distinct and definite objects. All that was needed to bring Government to a decision was the threatened extinction of the sugarcane crop in the Godavari district, due to the ravages of "red rot" (*Colletotrichum falcatum*) disease.

The history of Madras agriculture from 1863 up till the end of the century thus falls into three periods. The first witnessed the ascendancy of the idea of a model farm worked on western methods, the second was dominated by a barren discussion on agricultural education and, in the third, agricultural effort was blighted by the insistence on the importance of statistics. None the less, in spite of the difficulties under which they laboured, the work done by Mr. W. H. Robertson during his long tenure of office as Principal of the college and Superintendent of the experimental station at Saidapet and subsequently by Mr. C. A. Benson as Deputy Director of Agriculture left its mark on the development of the department after the reorganisation of 1905. In that development, former students of the Saidapet College played no inconsiderable part.

In 1901, Dr. Barber was allowed to lease, and in 1905 to acquire, land for research with the object of finding varieties of cane resistant to red rot. In the same year, two farms were opened for work on cotton, and similar farms were established for the study of pepper in 1902, and for work on groundnut and exotic irrigated cotton in 1904. Thus, by the time Lord Curzon's forward policy of agricultural development for the whole of India was initiated, the Madras department was already well under way. By 1906, ten farms had been established and a whole-time Director appointed. The expert staff, which up till then had consisted only of the botanist recruited in 1898, was strengthened by the addition of an agricultural chemist, and two deputy directors for district executive work. The college at Saidapet was transferred back to the Agricultural Department under a new principal and, in 1908, the students were moved to the larger and better situated college at Coimbatore. The expert staff was further strengthened, at intervals up till 1914, by the addition of a mycologist, a special officer for work in the planting districts, an entomologist, a second botanist and a third deputy director, and the various experts were provided with laboratories and facilities for research. Thus, by 1914, the department had reached a stage at which rapid advance might confidently be expected. It was tolerably well equipped in regard to fundamental research, investigation of local problems, education and propaganda. The immediate need was for more district officers of all grades to strengthen the link between the department and the cultivator. The non-gazetted staff was completely reorganised in 1916 and divided into two main sections, scientific and agricultural, each of which was subdivided into upper and lower divisions; and, by 1919, the number

of deputy directors' circles had increased to eight. Progress was to some extent retarded during and immediately after the war by the deputation of officers for duty in Mesopotamia, by the era of retrenchment which affected all departments, and subsequently by the fact that three of the most experienced officers in the department accepted posts elsewhere. The present strength of the department is—

Indian Agricultural Service officers	13
Madras Provincial Service officers	31
Officers on special contract	2
Subordinate Service—	
Upper	116
Lower	218

An indication of the rate at which the activities of the department are expanding is given in the fact that the departmental budget has increased from Rs. 7·73 lakhs in 1916-17 to Rs. 16·66 lakhs in 1926-27.

The research work is of two kinds. There is first of all the research into the fundamental problems underlying the practice of agriculture, which is carried on by a staff of specialists at the central institute at Coimbatore and at special stations. Linked up with that is the research carried on by deputy directors in charge of circles who have their own stations at which the discoveries of the central institute are tested for their suitability to local conditions, and who carry out investigations in connection with local problems affecting their circles. With the object of co-ordinating the experimental work carried on by district officers throughout the presidency, an advisory committee, consisting of the Director, the Agricultural Chemist, a crop specialist, the Professor of Agriculture and a senior deputy director has very recently been formed. Its functions are to review the experiments in progress at the district stations, to suggest new lines of enquiry and examine similar proposals put up by the deputy directors, to advise on the methods by which these should be carried out and to assist in interpreting the results.

The activity of the department centres in the estate attached to the Agricultural College and Research Institute, Coimbatore. The total area of the estate is about 500 acres. Of the 315 acres under cultivation, 45 acres are irrigated from the Noyil river, 124 acres are medium quality black soil, and the rest is red soil, partly under dry cultivation, and partly under garden crops irrigated from wells. A wide variety of crops is grown, including rice, sugarcane, cotton, wheat, millets, pulses, tobacco, linseed, garden crops and several fodders, and small plots of every crop in the presidency are grown for teaching purposes.

With the exception of the Paddy Specialist, who has a separate area away from the main farm, and the Livestock Expert whose headquarters are at Hosur in Salem district, all the investigations of the specialists are conducted on the Coimbatore estate. Considerations of space make it impossible to give more than a brief description of the more important lines of research now in progress or already completed.

An important activity of the Chemistry Section has been the conducting of soil surveys in several districts. The main result of these has been to show that phosphates are markedly deficient in all soils, although the deficiency does not appear to be quite so much in evidence in south Malabar which is the area at present under investigation. Of great potential importance in this respect are the mineral phosphatic deposits which are found in large quantities in the Trichinopoly district. These deposits are very insoluble, and the question of making them readily available as plant food and of the best combination in which they can be used is under investigation. A great deal of preliminary work has been done on the subject of the preparation of synthetic farm yard manure from straw and waste products such as groundnut husk and prickly pear, and the department hopes that it will soon be able to devise a simple method which can be demonstrated to the ryots. The only nitrogenous manure which has as yet found favour with the cultivator is ammonium sulphate, particularly when used in conjunction with superphosphate. Interesting work is in progress on the manner in which the manuring of a crop affects the vitality and the nutritive value of the grain; tests conducted by Colonel McCarrison, I. M. S., have shown that the nutritive value of wheat or *cholam* grown on a plot which received cattle manure was much higher than when the plot was manured with artificials only.

Other important lines of research, work on which has been completed or is still in progress, may be mentioned. The processes which take place in paddy soils during fermentation and nitrification have been studied, together with their bearing on manuring and cultivation of this crop. The great benefit due to green manure arose out of this piece of research. Improvement has been effected in the manufacture of coconut jaggery, an important cottage industry on the west coast. Ordinarily, the jaggery made from the juice of the coconut palm will not keep owing to the presence of chlorine which ultimately shows itself as calcium chloride, a very deliquescent product. A cheap and ready method has been evolved for the removal of the chlorine and good grade hard jaggery can now be made. A method on a practical scale has been worked out for malting *cholam* and preparing breakfast and invalid foods and this is now in a stage at which it can be taken up by private firms, though none have so far come forward to exploit it. A practical method has also been worked out for determining when sugarcane is ripe.

A bacteriologist has recently been added to the staff and a new sub-section to deal with animal nutrition problems is in process of formation. Apart from research, the section has a great deal of routine work to do. This consists mainly in making analyses in connection with the field research going on at the various experimental stations and, to a small extent, of soil and manure analyses for the public.

The Botanical Section has much systematic work to its credit, notably the herbarium collection on which the *Flora of Madras*, now under compilation at Kew, is based. Of chief interest however, from the economic point of view, is the work on the major crops. For rice there are now four breeding stations in the charge of the Paddy Specialist, the main

station at Coimbatore, and sub-stations at Aduturai, Maruteru and Pattambi, each serving different rice tracts. Economic work is also being carried out by deputy directors on the stations at Anakapalle, Samalkota and Palur. Four improved late-maturing varieties have been evolved and issued from the Coimbatore farm and seven early varieties from Aduturai, and it is estimated that at least a quarter of a million acres of the latter are now grown in Tanjore and Trichinopoly districts. The other two farms under the specialist have been started only recently and are not yet in full working order, although mass selection for the Godavari delta is being done on four varieties at Maruteru and single plant selection is also in progress. The new station at Pattambi is designed to serve the west coast districts of Malabar and South Kanara and will deal with single crop, double crop, treble crop and dry *modan* (hill) rices.

The Paddy Specialist is also making an attempt to improve the system of *udu* cultivation, a method under which the crops are grazed by cattle or cut to check excessive vegetative growth. His idea is to sow a mixture of short and long duration varieties in suitable proportions, so that when the early variety is harvested there will be plenty of room for the late crop. Other problems, too, are engaging his attention—questions of cultivation and manuring about which no definite conclusions have yet been reached, the effect of sowing at different seasons, the period for which seed retains its germinating power, and the cooking qualities of different varieties. Root systems are being studied in relation to soil conditions in different areas. Technical studies are concerned chiefly with the possibility of evolving, by means of hybridisation, varieties of rice which will be immune to disease. A typical example of the necessity for such work is the case of the *korangusamba* variety which is very popular in the Tanjore delta but is particularly susceptible to attack by the fungus *Piricularia oryzae*. The work is being done in close collaboration with the Mycological Section.

The Anakapalle farm, which serves the Vizagapatam district, is devoting attention to selection work and to manurial questions. Results so far obtained with the latter show that an application of about a ton per acre of *sann* hemp leaf to land well supplied with phosphate will raise the yield by fourteen per cent. This is encouraging as in that district it is possible to grow as much as 4·5 tons of *sann* hemp per acre, as a *punasa* (early) crop, in three weeks to a month. On the Samalkota station, selection work is in progress with intermediate season varieties of rice, as well as second-crop varieties, and comparative trials between these and Coimbatore varieties are being carried out. At Palur, a search is being made for improved long duration and short duration strains with a fair measure of success.

Work on cotton is now in the general charge of the Cotton Specialist. The area under this crop was about 2·2 million acres in 1927, practically all of which was medium staple. It is an important crop in four distinct tracts, the Deccan districts in the north, the Guntur and Kistna districts in the east, the Salem and Coimbatore districts in the centre, and the Tinnevelly, Madura and Ramnad districts in the

south. The two common indigenous varieties grown are *Gossypium herbaceum* and *Gossypium indicum*, and are known on the market under various trade names. 'Westerns' and 'Northerns', which are grown in the Deccan districts consist of varieties of *herbaceum*, with a variable proportion of *indicum*; they have a staple of $\frac{5}{8}$" to $\frac{7}{8}$" and a low ginning percentage. Important progress has been made, as the result of work by the present Cotton Specialist when he was a district officer, by the introduction of a pure *indicum* type of 'Northerns' (Nandyal 14) and a selected 'Westerns' (Hagari 25), both of which command a premium over the ordinary crops which contain a mixture of red and white cotton. 'Tinnevellies', which are grown in the south of the presidency also consist of a mixture of *karunganni* (*indicum*) and *uppam* (*herbaceum*) in varying proportions. This mixture is being widely replaced by selections of *karunganni*, known as 'Company' cottons, evolved on the Koilpatti experimental farm; two strains in particular are favoured, No. 2 and No. 3; the first ripens unevenly and has a ginning percentage of 29 to 31; the second is a uniform ripener with a ginning percentage of 30 to 33; the length of the staple in both strains varies from $\frac{7}{8}$" to 1". The area under improved *karunganni* in the southern districts of Madura, Ramnad and Tinnevelly is now something like 300,000 acres. It should, however, be mentioned that there is practically no pure *karunganni* grown except on seed farms; outside those farms, there is usually a small mixture of *uppam*. *Karunganni* still passes under the trade name of 'Tinnevellies'; with the exception of the Nandyal 14 variety which is grown on a much smaller scale, it is the best of the cottons indigenous to Madras, being regularly quoted and dealt in on the Liverpool market.

More remarkable still has been the success of the exotic cotton, Cambodia, an American type, the seed of which was obtained direct from Cambodia in 1905, by Mr. C. A. Benson, the Deputy Director of Agriculture in Madras. It was grown at the outset as an unirrigated crop on the black soil of the Koilpatti farm and, in such conditions, showed little promise. Its rapid extension throughout the southern districts of Madras was, in no small measure, due to the discovery by Mr. A. Steel, of the firm of Messrs. A and F. Harvey and Company, of its possibilities as an irrigated crop on red soils. At times it suffers severely from attack by the stem weevil (*Pempheres affinis*). A new strain, No. 440, which is vigorous enough to yield well despite attack has been isolated.

Cambodia is found chiefly in the Salem-Coimbatore area, and in Trichinopoly, Madura and Ramnad in the south. It has not replaced any indigenous cotton but is cultivated mainly on land which had previously yielded precarious crops of rice, on very favourably situated dry land, and as a rotation in garden land under well-irrigation. The best quality comes from Tiruppur in Coimbatore and from Bodinayakkanur in Madura. When grown as an irrigated crop, it is superior to all the indigenous cottons in yield and quality, with a staple of 1 to $1\frac{1}{8}$ inches and a ginning percentage of 33. The unirrigated crop is, however, apt to be inferior

and there is a tendency to grow it on unsuitable land. In such cases, an attempt is being made to replace it by 'Company' cottons. At present, Cambodia covers an area of about 410,000 acres, two-thirds of which is irrigated.

Although, as we have seen, the improved *indicum* strain (Nandyal 14) and Company strains have found favour, the ryot has a strong liking for *herbaceum* varieties on account of their early and uniform maturing qualities. For this reason, an intensive investigation has been undertaken with the help of funds supplied by the Indian Central Cotton Committee, the object being to evolve from the *herbaceum* constituent a strain in which will be combined the respective merits of both *indicum* and *herbaceum*. Arrangements have been made, again with financial assistance from the Indian Central Cotton Committee, for research into the relative susceptibility and immunity of various strains of cotton to damage by the stem weevil, and into the problems connected with bud, flower and boll shedding. These investigations will be undertaken as soon as the necessary staff is forthcoming.

Work on sugarcane is the parent of the research activities of the department. It began indeed many years before the department came into existence. Varieties from other cane-growing countries had been imported by the Board of Revenue as long ago as the early 'forties' of last century, and at later dates by Mr. Gillman, I.C.S., manager of the Vizianagram Estate, from Mauritius. The latter varieties were transferred in 1900 to the Samalkota farm which was established for the purpose of discovering canes capable of resisting the "red rot" disease then so prevalent in the Godavari delta. The work done on that farm led to the speedy replacement of the local canes by the Striped and Red Mauritius varieties. The former quickly succumbed to disease and the latter underwent deterioration and both were superseded by the Purple Mauritius variety in the Godavari area, though Red Mauritius is still a favourite in some localities.

A breeding station was started at Coimbatore in 1912, at which new canes are raised from seed. As the station is under Imperial control and was designed to meet the needs of northern India, attention has in the past been concentrated mainly on thin canes rather than on the thick canes suited to the Madras Presidency. The station has, however, recently been extended in order to provide space for work on thick canes. These, in the meantime, have been studied at Samalkota, Palur and Anakapalle, the last named of which is to be developed into a cane-testing station for the presidency, at which the seedlings evolved at the Imperial station will be tried out. Apart from Red Mauritius, the varieties which have been introduced in recent years are J247, B208, and Fiji B. Among others, J247 has achieved popularity owing to its disease and drought resisting qualities, although it has the defect of late maturing.

Work on millets has only been taken up in recent years. It is under the charge of a specialist who has a special staff and a breeding station at Coimbatore. Progress is being made rapidly with *cholam*

and *ragi* and it is expected that the Millets Specialist will be in a position to put out new and improved strains in the course of a year or two.

Coconuts are a very important crop on the west coast. Out of a total estimated area under this crop of 552,815 acres, 376,500 are situated in Malabar and South Kanara. Three special experiment stations have been established, one of which was an existing garden, the other two being planted *de novo*. A number of valuable discoveries have been made, chiefly concerning the benefits to be obtained from wide spacing and inter-cultivation. One of the most important relates to the method of planting this crop on high lands. It has usually been held by the cultivators that coconuts can only be grown if they can be watered during the hot weather. The department has shown that this is not the case, and that if wide spacing is adopted and the land is originally cultivated and drained, and if it is constantly inter-cultivated during the hot weather in order to maintain the soil mulch, watering is quite unnecessary. Two stations have been planted up on this dry system and the trees have not only grown very satisfactorily but have come into bearing much earlier than is usually the case in the district. This method has been widely demonstrated by the establishment of small plots in the compounds of travellers' bungalows, municipal and taluk office compounds, etc., and large areas of hitherto waste land are in consequence being planted up. It is estimated that some 500,000 acres or more might be similarly planted up.

Recently, work has been begun with the cross fertilisation of selected types of palm with the idea of evolving a high yielding strain. This will naturally take time and it is complicated by the fact that, in Madras conditions, the palm is always cross-fertilised.

The necessity for a Mycological Section was brought into prominence by a severe attack of bud-rot (*Pythium palmivorum*) on the palmyras of the Godavari delta. The disease was first investigated by the Imperial Mycologist in 1906, but it was not until 1913 that the fungus was isolated and proved to be fatal to coconuts as well as palmyras.

The preventive measures recommended are the cutting away and burning of all diseased tissue before the growing tip is affected. These measures have been applied with the help of legislation, to the Guntur, Kistna, and Godavari districts. This campaign has undoubtedly diminished the disease and brought it under a measure of control, but it still exists and there is little prospect of eliminating it altogether. Cyclones, which are of frequent occurrence in these districts, are a factor in its dissemination and, after one of these visitations, the disease always appears again with renewed activity. Another fungus which has been dealt with is that which causes "bleeding disease" in coconuts, the symptom of which is the exudation, from the stem, of a red viscous liquid. The remedy consists in cutting out the affected part, burning the wound so as to check the flow of sap, and then coating the cut surface with tar. *Mahali* disease, a form of phytophthora which affects the fruit of the areca palm, has been very successfully dealt

with by spraying with Bordeaux mixture and this practice is now adopted on millions of trees. The 'mildew' disease on grapes has been effectively dealt with in a similar manner.

Other instances are the protection of the *cholam* and *tenai* crops against smut by steeping the seed before sowing in a solution of copper sulphate and the prevention of red rot in sugarcane by introducing resistant varieties. Methods of preventing the spread of disease have been partially worked out in the case of paddy 'blast', 'fruit rot' in chillies, 'leaf rot' in ginger, 'scab' in lemons and limes, and various diseases affecting planters' crops. At the present time, the relative resistance of different varieties of paddy to 'blast' is being studied in collaboration with the Paddy Specialist with a view to finding a variety which is more or less resistant in the hope that it may be used for crossing with other varieties, and a similar investigation is in progress with regard to the mosaic disease of sugarcane and the wilt disease of groundnut.

The Entomological Section came into existence as a separate section in 1912. Until then attention had been devoted to the compiling of information with regard to the chief pests of all crops, a work which culminated in the publication of "Some South Indian Insects" by Mr. Bainbrigge Fletcher in 1914. No striking instance can be recorded of control methods being taken up co-operatively by cultivators over large areas at the same time, although the demonstration of simple and cheap methods of control has met with some local success. The section is handicapped by the fact that news of damage by a particular pest seldom arrives until the damage has already been done and by the fact that it is practically impossible to persuade ryots to co-operate to deal with a pest over a large area, however simple the methods recommended may be. In some places, the religious objection of the people to taking life is also a handicap to the entomologist.

Perhaps the most important work of this section has been the detailed research into the life histories of the pink boll worm and stem weevil, and the damage done to cotton by these pests. The loss to the crop was so severe that the aid of the Madras Insects and Pests Act was invoked to check it. The only method of control which has been discovered is to ensure a dead season between one year's crop and the next, so that no cotton will be left on the ground on which the grubs can feed. When the Act was first applied in 1920-21, it was laid down that all Cambodia cotton should be removed from the fields and destroyed by the 1st of August each year, thus ensuring a dead period of at least two months before the next sowings began. The Act, however, provided for notice of eradication being given and also allowed time for appeal, with the result that the cotton was seldom removed before the end of August. In view of the extreme unpopularity of the original Act, an amendment has now been introduced stipulating that no notice need be given and deferring the date by which removal must be complete till the 1st of September, but the opinion of the Agricultural Department is that the resulting dead period is insufficient for effective control

and that extension rather than curtailment of the period originally prescribed is essential.

A caterpillar pest introduced by rail a few years ago into the west coast districts has done a great deal of damage to coconuts. This pest exists on the coconut palms on the east coast but there it is comparatively harmless, a fact which was found to be due to its being kept under natural control by certain parasites. The pest was unfortunately introduced into the west coast districts without its controlling parasites and consequently it spread very rapidly and became a pest of major importance. The department have taken steps to control the pest biologically by breeding the parasites in large numbers and introducing them into the infected areas. This method has met with encouraging success but it is hampered to some extent by the presence of a hyper-parasite and also by the fact that the climate of the west coast is at certain times of the year detrimental to the parasites proper.

The Horticultural Section is concerned with the botanical gardens at Ootacamund, the pomological station at Coonoor and the experimental fruit gardens at Burliar and Kallar. The pomological station, which is about twelve acres in extent, was opened in 1920 for work on the different fruit trees suitable to the hills of southern India. Experiments in pruning and manuring as well as systematic testing out of different varieties are carried on. At the Burliar garden near Coonoor, a large number of varieties of tropical fruits and spices are grown. The Kallar garden, which is at the foot of the hills near Mettupalaiyam, was taken over from the Forest Department in 1900. It is planted with rubber, fibre-producing plants, teak, mahogany and tropical fruit trees. Experiments are being made with the valuable medicinal plant *Cephaelis ipecacuanha*.

The Engineering Section is in the charge of two gazetted provincial officers, one of whom is concerned solely with teaching work in the college. The whole time of the other is devoted to the upkeep of the estate buildings and equipment. A post of research engineer has been sanctioned and the appointment will be made in April, 1928.

For administrative purposes, the presidency is divided into eight circles, each in charge of a deputy director who has the help of an assistant director and of a number of qualified demonstrators. At present, the jurisdiction of each demonstrator extends over two or more taluks, but it is hoped that in the near future, the staff will be increased so as to allow one demonstrator for each taluk. The nature of the improvements which are being introduced is indicated broadly in the general account which has been given of the research work in progress. They consist in the use of iron ploughs and better methods of cultivation, the use of better *mhote* buckets and wheels, the growing of green manures instead of depending on the forest for leaf mould, better methods of making and storing cattle manure, economical methods of transplanting paddy seedlings, better strains of seed. In the cotton areas, demonstrations deal with new strains of seed which give bigger yields and a better quality of lint, drill-sowing and inter-cultivation with bullock power,

better methods of irrigation, clean picking, and co-operative ginning and marketing. In the sugarcane areas, deep cultivation, line planting, propping and wrapping, manuring, the use of iron crushing mills and McGlashan furnaces are demonstrated. Much attention is also given to protective measures against insect and fungoid pests.

With regard to ways and means of bringing improvements to the notice of the cultivator, past experience has shown that the experimental farm, in itself, has not exercised a very potent influence. The ryot is not easily persuaded to travel even short distances to visit experimental stations and, when he does, he is apt to think that the practices adopted there are not suited to his limited resources.

Exhibitions and demonstrations provided at fairs and religious festivals have to compete with many counter attractions for the cultivators' interest. Owing to the general illiteracy of the people, publications and leaflets have a very limited field; but where the people are able to read, use is made of them very freely. Departmental leaflets written in simple words and published in the various vernaculars are issued either free or at a nominal cost. Each year, the department issues, both in English and the vernaculars, what is known as "The Villagers' Calendar". This is a simple handbook in which the various activities of the department are explained and which contains a number of articles dealing with simple methods of improvement. Another publication of the department which has proved popular is that known as the "Monthly Digest of the Operations of the Department," a short summary in simple language of the current work of the department, both in the districts and in the research institute. It is also used as a medium of instruction in simple methods of general agricultural improvement. It too is published both in English and the vernaculars and is distributed free to people who are likely to benefit from it.

The method which has achieved the greatest success is the establishing of demonstration plots on the ryots' own land. A complete record of the cultivation expenses of these plots is kept by the demonstrator in charge and, wherever possible, the record is completed right up to the weighing of the produce. In all cases, the improved method is contrasted side by side with the method which it is desired to replace. Many hundreds of such plots are scattered all over the presidency. A variation of the "demonstration plot" is the "demonstration area" system of which three types are found. One method is to mark out an area on an experimental farm and devote it entirely to commercial farming. Another method is in use in No. 4 circle and is really the 'plot' system on a larger and more elaborate scale, the essential differences being that a larger area is taken and a profit and loss statement which includes the cost of all operations is published. The system has been further developed in No. 5 circle where a number of co-operative societies have started demonstrations of their own, under the guidance of departmental officers.

In the absence of reliable seed merchants, the question of the multiplication and distribution of seed, and of keeping it pure, is a very

difficult problem. In the case of cotton, the seed of a new strain which it is desired to introduce is given out to selected ryots, on the understanding that they will carry out the cultivation on lines laid down by the department and will keep the seed pure. At harvest time, the department either buys the *kapas* (unginned cotton) outright, retaining the seed for future distribution, or it encourages the ryots to gin their *kapas* co-operatively, and merely buys the seed from them, offering a small premium over the market rate prevailing. An organisation on similar lines is in existence in the paddy areas. This " seed farm " system works very satisfactorily as far as it goes, but the quantity of seed obtained is limited by the amount of funds placed at the disposal of the department for the purpose, and is not nearly sufficient to meet the demand. A scheme is now under discussion with the Registrar of Co-operative Societies which contemplates the conversion of these seed farms into co-operative societies for the express purpose of producing seed in the paddy areas, and for combining seed production with co-operative ginning and selling in the cotton tracts.

We have seen that an attempt was made to impart some sort of training in agriculture in the very early days of the department and that the courses for apprentices at Saidapet were not very successful. From 1872 onwards, schemes for an agricultural college began to receive serious consideration, and the result was the opening of the Saidapet Agricultural College in 1876. The institution was attached to the Education Department; a three years' course was given and no fees were charged. The theoretical nature of the teaching imparted is sufficiently indicated by the fact that the lecturers were members of the staff of the Medical and Engineering colleges and that no laboratory accommodation was provided. Applications for admission came in very freely from places as far away as Ceylon, Bengal and the Punjab. Thirty students attended the first year's class.

In 1884, proposals were put forward that Saidapet should be developed into a central institution for the teaching of agriculture, veterinary subjects, medicine and forestry. These proposals were not fully accepted but, in 1886, the college was brought under the Technical Scheme of Higher Examination in Science and Arts. The tendency under this scheme was to make the course more and more theoretical and the central idea of agriculture appears to have been almost lost sight of. In 1890, a committee, charged with the revision of the curriculum, recommended that certain technical subjects should be abolished, but, even after the recommendation was carried out, the college was still teaching for ten different technical examinations. In 1902, as the result of the findings of another committee, much more attention began to be paid to practical agriculture and, in 1906, the control of the institution passed from the Director of Public Instruction to the newly organised Agricultural Department.

From the point of view of its direct effect on the agriculture of the presidency, the Saidapet College did not prove a success. It had many difficulties to contend with, chief of which was that it was in no sense

in touch with the agricultural population, nor did it possess any means of overcoming that obstacle. As has already been mentioned, the college was transferred from Saidapet to Coimbatore in 1908.

Originally, only one course was provided at Coimbatore and all students were put through it, whatever their capabilities or ultimate objects. Even so, it was an advance on the teaching given at Saidapet in that it was not an agglomeration of different courses of which agriculture was one, but a balanced course in which the agricultural aspect was given due prominence. In 1914, two separate courses were instituted, one leading to a diploma and the other to a certificate. The student on entering the college joined the certificate course and, if he attained a satisfactory standard in that course, he was allowed, if he so wished, to proceed to the diploma. The combined course lasted for three years.

In 1920, however, a differentiation was made in the qualifications demanded for admission to these courses, the object being to attract a better type of student to the higher course. A further development took place in 1922 when arrangements for the affiliation of the college to the University of Madras were completed and the diploma course gave way to a three years' course leading to the degree of B.Sc. in Agriculture, admission to which could only be obtained by those who had passed the university intermediate examination in groups I and II. Thereafter the attendance in the certificate course fell away to such an extent that it was abolished in 1924.

Some forty students are admitted every year. About a dozen scholarships are granted, some of which are reserved for members of backward communities.

The new arrangement still fails to attract the desired class, the sons of farmers who intend to earn their living by farming. This is due, in the opinion of the Director of Agriculture, to several causes, the expense of a five-year course—two years intermediate at the university and three years at the college—being one. There is also the desire to utilise a degree to get work other than farming, and the fact that few posts outside government service are open to graduates in agriculture.

Two agricultural middle schools were opened in 1922, one at Taliparamba and another at Anakapalle. For the staffing of these schools, four officers of the Agricultural Department were deputed to the Education Department for a six months' period of training in teaching methods. The students are given practical instruction in ordinary cultivation work on the school farm and are also taught reading, writing, arithmetic, geography, nature study, civics and chain-surveying, elementary entomology and mycology. The Taliparamba school is reported to be doing well, though the ultimate criterion of success will be how far the pupils who pass through it are absorbed in agricultural occupations. The Anakapalle school was closed at the end of last year. In 1927, an officer of the Education Department was deputed to study the Punjab type of agricultural education and a proposal is now under consideration to include agriculture as one of the subjects in higher elementary and middle schools.

The presidency possesses at least three breeds of cattle of recognised merit, namely, the Ongole, the Kangayam and the Allambady. The Ongole breed enjoys a reputation which is not confined to India alone. The males are fine heavy animals which in draught qualities can stand comparison with some of the best known breeds in the world ; the cows, too, are heavy milkers when judged by Indian standards. Large numbers were at one time exported to the East Indies and South America but the trade is now prohibited. The Allambady is primarily a light draught animal, long of leg and spare of flesh ; it seems to be closely related to the famous Amrit Mahal of Mysore which is considered to be an excellent type of light draught animal. The Kangayam is a short, compact animal, sturdy in build and handy to work. Notable in connection with this breed are the extensive breeding operations being conducted by the Pattagar of Palayakottai, whose cattle are in demand all over the presidency and whose solitary example might well be followed by other large landowners. Apart from the undoubted merits of these breeds, the quality of the cattle in the presidency is, of course, largely dependent on the food supply and climatic conditions. Thus, in the Coimbatore, Salem, North Arcot and Nellore districts where fodder is plentiful, the quality is well above the average; it is not so good in the purely rice areas where they are fed mostly on rice straw, while in the Deccan districts, Malabar and Ramnad it is distinctly worse. In the Deccan districts, the rains are light and there is not enough water to grow purely fodder crops. In Malabar, the question of grazing grounds is not of pressing importance and all over the district there are thousands of acres of unoccupied dry lands and private forests where the cattle graze without let or hindrance. Hence the small area of government forest thrown open to grazing. In the monsoon, the cattle grow sleek and fat upon the new grass that springs up on the waste lands, but in the dry weather, when the grass dies down they revert gradually to their normal half-starved condition. The remedy for this probably lies not in any extension of the already considerable grazing grounds but in the growing, by the ryots themselves, of fodder crops for use in the dry season, an idea hitherto unknown in Malabar but now beginning to receive attention.

The improvement of livestock is entrusted to an expert of the Agricultural Department who has three breeding farms in his charge, with headquarters at Hosur.

The Hosur farm was taken over in 1924 from the Army Remount Department, in whose hands it had been for 96 years. The farm is 1,635 acres in extent, of which 65 acres are irrigable and are under fodder crops: the remainder is pasture land of varying quality. Several lines of improvement are being attempted although none of them are on a very large scale. A small pure-bred Kangayam herd is being improved for the dual purpose of milk and draught. The calves are allowed to suckle but each cow is fully milked one day per week to ascertain the milk yield ; the average for the herd is about six pounds (one-and-a-half Madras measures) per day. The so-called " Bangalore " herd consists of half-breds, the result of mating an Ayrshire bull with pure Sindhi and

Sahiwal (Montgomery) cows. Half-bred is mated to half-bred, the object being to produce heavy milkers for the Madras milk supply. The possibilities in this direction, in so far at least as the first Ayrshire cross is concerned, are indicated by the fact that one cow has given over 12,000 pounds of milk in a lactation.

The " Coimbatore " herd is a mixed lot of cross-breds, some being one-quarter Ayrshire, some three-quarters, seven-eights, etc. On some of the cows pure country bulls, and on others half-bred bulls are used. The daily average production of milk per cow is about ten pounds (two-and-a-half Madras measures). It does not appear that the policy of breeding up to the Ayrshire is likely to be a success ; the calves are weak and subject to a heavy mortality and, in future, the three-quarters and seven-eighths Ayrshire crosses are to be served by a pure country bull of the Sindhi and Sahiwal breed.

A dairy herd of pure Ongole cattle is in process of being built up, and here the prospects are much more promising. Several cows have given an average of thirteen pounds (three-and-a-quarter Madras measures) of milk throughout a lactation. The average for the whole herd in 1925-26 was over eleven pounds and this was considered to be satisfactory, most of the cows being first calvers.

A small herd of pure Sindhi cattle is also maintained with the object of breeding for the west coast area.

The farm at Chintaldevi comprises about 800 acres, of which 531 acres are under grass. It is situated 36 miles from the nearest railway station and was opened in 1918 for work on the Ongole breed. It carries a stock of about 150 animals. The yields of some of the young cows are promising.

The opening of the Guntur breeding farm dates back only to 1923. The main object here is to improve both the size and the milking capacity of the country buffalo by crossing with the Delhi bull. The farm is 150 acres in extent. This, with the dairy maintained at Coimbatore for teaching purposes, completes the list of institutions dealing with cattle. The department has as yet only touched the fringe of the problem of cattle improvement. Excluding the Coimbatore dairy, the total head of stock carried by the three farms under the Livestock Expert, at the beginning of the year 1925-26, numbered only 388, and the number of bulls sold in the year 1926-27 for breeding purposes was twelve. It is obvious that but little impression will be made on the twenty-two million cattle of the presidency by improved breeding unless and until the scale of the present-day operations is very greatly extended.

6. THE VETERINARY DEPARTMENT.

Thirty-five years ago, the only veterinary organisation that existed in the presidency was a hospital at Saidapet and a few stock inspectors attached to the Agricultural Department. The present Civil Veterinary Department originated with the appointment in 1893 of an executive veterinary officer and was under the control of the Board of Revenue

until 1916-17. The department to-day is independent, control being vested in the Veterinary Adviser to the Government of Madras who is directly responsible to Government. His staff consists of four Imperial officers. Of these, three are attached to the college and one is in charge of a circle. There are also five gazetted assistants in charge of circles and one attached to the college. The Subordinate Service is manned by 230 assistant surgeons, ten of whom are employed in the college and the rest are employed upon executive work.

The departmental budget in 1916-17 was Rs. 2,20,700 and in 1926-27 Rs. 7,54,900 ; these figures give some idea of the rate at which expansion has proceeded within the past decade.

The activities of the department can be broadly divided into (*a*) Education, (*b*) District Work and (*c*) Research. The college dates from 1903 although the present building was not occupied until 1905. The staff includes the professors of pathology and surgery and several lecturers and assistant lecturers. Ordinary and post-graduate courses are provided. The former leads up to a diploma and lasts for three years. The advisability of adding an extra year has been recognised but financial considerations have up till now stood in the way of this. Definite proposals to extend the course have now been made and are being examined. Forty students can be accommodated in each class. Fifteen stipends, of the value of fifteen rupees per month, are granted annually of which a certain number are earmarked for the backward classes ; the general instruction is free to all students approved by the Selection Committee.

For administrative purposes the presidency is divided into six circles, each in charge of a gazetted officer. The district staff is divided into assistant surgeons in charge of veterinary institutions and touring assistant surgeons. Veterinary institutions are increasing in number year by year and are now about a hundred. Up till 1922, they were under a system of dual control by Government and local bodies, Government contributing part of the expenses of upkeep. The scheme did not prove successful and complete control of all but a few private institutions was taken over by Government. They provide veterinary treatment, free of cost to all *bona fide* cultivators who care to take advantage of the treatment.

The touring staff were originally engaged mainly in attending to outbreaks of contagious disease. The widespread prejudice against inoculation that existed in the early days required the assistants to be constantly moving about among the villages doing propaganda work, with the result that they were on tour for twenty days in the month. Of late, however, prejudice has given way to such an extent that systematic touring of this kind has been abolished, and when not actually attending outbreaks of contagious disease, this touring staff is employed in running camp dispensaries, which are shifted about every ten days or so, and during that time render whatever aid is required in surrounding villages. At one time, a mobile corps existed for the purpose of dealing with severe outbreaks of rinderpest wherever they occurred, but, the necessity for it having disappeared for the time being, it was disbanded and the staff

was strengthened in the frontier districts through which rinderpest mainly gains access to the presidency.

Administrative and teaching duties make such a heavy demand on the time of the staff that they have but little opportunity for pure research work. Nevertheless, at least two pieces of good research work have been turned out from the Madras College laboratory, one dealing with nasal granuloma, and the other with bovine lymphangitis in cattle.

A Cattle Diseases Act is in force to prevent movement of cattle from an infected area but strict enforcement of its provisions is often found difficult.

7. IRRIGATION.

In respect of area under irrigation, Madras stands second among the major provinces of India. The total area irrigated for the five years 1921-22 to 1925-26 averaged over 9·3 million acres, of which 3·8 million acres were under canals, 3·4 million acres under tanks, 1·7 million acres under wells and nearly half a million acres under 'other sources.' The irrigation sources of Madras present special features. Tanks occupy a prominent position, the area irrigated from them being nearly twice as great as in any other province, and over half the total area under tank irrigation in British India. The great irrigation systems, the Godavari, the Kistna, the Cauvery and the Pennar differ completely from those in the north of India. They are in the main deltaic, and the problem has been to regulate the supply rather than to extend it to new areas. The works consist of weirs by which a sufficient head of water is obtained to irrigate the lands of the deltas and of sluices and regulators by means of which the water is conducted over the land. The oldest of these is the Cauvery delta system in the Tanjore district, some two hundred miles south of Madras, which dates back some 1,600 years and, even before the improvements effected in the nineteenth century, irrigated over 600,000 acres. It now irrigates nearly a million acres of first and second crop. Of the modern systems, the Pennar River canals system, 100 miles north of Madras, irrigates about 200,000 acres of first and second crop and 100 miles further north again the great contiguous delta systems of the Kistna and the Godavari irrigate between them 1·8 million acres of first and second crop.

The only example of a great storage reservoir in the Madras Presidency at present is the Periyar system. The main feature of this system is the impounding by the construction of a large dam, 3,000 feet above sea level, of the waters of a river which would otherwise have flowed into the Arabian Sea, and their diversion to the other side of the peninsula through a tunnel bored through the main watershed of the country. This system irrigates about 180,000 acres of first and second crop, mostly in the Madura district.

The possibilities of the large systems fed from anicuts have now been largely exhausted and future irrigation schemes will probably have to be of the expensive reservoir type. Several storage projects have been proposed. The Mettur Reservoir, between the Salem and Coimbatore

districts, which is now under construction will secure and improve the water supply of an existing irrigated area of over a million acres in the Cauvery delta and will bring under irrigation for the first time a further area of 301,000 acres in the Tanjore district, a large proportion of which may be double cropped. On the Bhavani, a reservoir is proposed near Mettupalaiyam and the scheme provides for the irrigation of 110,000 acres of first crop and 60,000 acres of second crop in the Coimbatore district. The two other principal schemes in view are for reservoirs on the Tungabhadra and Kistna rivers. They have been the subject of prolonged investigation; but both technical and financial difficulties have stood in the way of their execution. Attention is being concentrated at present on a revised scheme for impounding the waters of the Tungabhadra by the construction of a reservoir at Timmalapuram in the Bellary district. This would provide water for wide extensions of irrigation, mainly in the districts of Bellary, Anantapur and Kistna; and would protect a very large area of dry cultivation in a tract liable to scarcity.

Some 28,000 tanks are controlled by Government and of these nearly ninety per cent are in the charge of the Revenue Department. They vary from large works irrigating thousands of acres by an elaborate network of channels, to small pools protecting a few acres in their immediate vicinity or serving to maintain the water level in neighbouring wells. For the last thirty years, an extensive scheme for restoring tanks which have silted up or otherwise fallen into disrepair has been in operation. The scheme covers an area of 102,000 square miles and, by March 1926, restoration over an area of 80,000 square miles had been made at a cost of 1·5 crores of rupees.

Wells, though not so important as either tanks or canals, irrigate nearly 1,700,000 acres or some 20 per cent of the total irrigated area. In certain districts, such as Anantapur on the northern borders of the Mysore State, the cultivator depends mainly on this source of irrigation. Wells are also specially important in the Chingleput, South Arcot and Coimbatore districts. In recent years, except from 1916 to 1920, when the work was temporarily transferred to the Agricultural Department, the Department of Industries has been responsible for the development of wells. Since the Department of Industries resumed charge in 1920 up to March 1927, 8,630 borings have been put down of which about sixty per cent have been successful. Two surveyors have been employed since 1914 on the work of connecting the levels of bore holes put down by the department with main sea level. These surveyors have so far been able to connect the levels of less than 4,000 out of 7,000 bore holes put down in the districts of Vizagapatam, Kistna, Guntur, Nellore, Chingleput, South Arcot, Tanjore and Trichinopoly. The work is in progress in the Tinnevelly and Coimbatore districts. But it is only in the Chingleput and Kistna districts that any appreciable progress has been made and even here, many more borings will be necessary before it is possible to prepare a map of underground water currents. A systematic survey of the underground water supplies would be a very costly proposition.

It has, however, been decided that, as an experiment, an intensive survey of underground water should be made in fourteen villages of Bellary *firka*, a tract liable to drought. The services of a practical water diviner to minimise the number of unsuccessful borings will also be utilised in connection with this experimental survey.

The Table below gives the main particulars of the progress of irrigation in the presidency up to March, 1927, from the year 1908-09, the first year for which figures are recorded in the "Agricultural Statistics of India" in a fairly complete form :—

Year	Area sown.*	Percentage of increase or decrease over 1908-09	Area irrigated*	Percentage of increase or decrease over 1908-09	Percentage of area irrigated to area sown
	Acres		Acres		
1908-09	38,035,000	....	10,827,000	....	28·5
1914-15	39,091,000	+2·8	11,282,000	+4·2	28·9
1920-21	37,606,000	−1·1	11,177,000	+3·2	29·7
1924-25	37,924,000	−0·3	10,956,000	+1·2	28·9
1926-27	37,367,000	−1·8	10,570,000	−2·4	28·3

*Areas twice sown and twice irrigated are counted twice.

The areas irrigated by canals, tanks, wells and other sources at the beginning and end of this period are as follows :—

Year	Canals	Tanks	Wells	Other sources
	Acres	Acres	Acres	Acres
1908-09	3,554,000	3,189,000	1,322,000	1,376,000
1926-27	3,028,000	3,073,000	1,570,000	437,000

Irrigation in the presidency is free from any serious problems arising from alkalinity or waterlogging. Here as elsewhere, however, damage to the soil has occurred in many irrigated areas owing to over-watering. Experiments have been made by the Agricultural Department with a view to determining the amount of water which crops require to give the best results and, on the basis of these experiments, propaganda work has been carried out among the cultivators. It is thought that the introduction of the volumetric system may probably prove the ultimate solution of the problem of securing an economical use of water but there appears no prospect of introducing the system until the cultivators on a branch distributary are willing to co-operate in the distribution of water. It is, therefore, the policy of Government to encourage the formation of irrigation *panchayats* with a view to creating a spirit of co-operation. Certain irrigation channels in the Godavari and Kistna deltas are already managed by *panchayats* and the majority of them are doing their work satisfactorily.

Irrigation advisory boards which, as their name implies, have no executive functions, have been constituted for the irrigated areas under the Godavari, Kistna and Cauvery.

The Government have decided to retain in their own hands the development of the hydro-electric resources of the presidency. The scheme for utilising the waters of the Pykara in the Nilgiris is the only important hydro-electric project which is under active consideration. The scheme is designed to supply the districts of the Nilgiris, Coimbatore, Salem, Madura and Trichinopoly in its first phases, besides supplying current for the electrification of two or three sections of the South Indian Railway. The estimated expenditure is between three and four crores of rupees for an installed capacity of 37,500 K.W. Ultimately this may possibly develop into a wider project with a capacity of 67,500 K.W. and a distribution system extending to Madras. Other schemes are being investigated also, the two chief being for the generation of power at Papanasam in the Tinnevelly district and at Kolal in Vizagapatam.

8. FORESTRY IN RELATION TO AGRICULTURE.

The forests of the presidency cover an area of about 19,000 square miles. They have been divided into two main classes, forests which are of provincial importance, as being either remunerative to the State or protective, and areas, mainly scrub jungle or grass reserve, which are of strictly local importance. In regard to the latter, Madras has broken away from traditional methods of forest administration in India by handing over large areas to *panchayats* working under the Board of Revenue and the District Collector. 3,360 square miles of reserved forest have been classified as ryots' forests, of which 3,264 square miles had been handed over at the end of January, 1928. The *panchayats* are supervised by a special Panchayat Officer who works under the Board of Revenue which fixes the rent to be paid for the *panchayat* area and the number of cattle which may graze in any particular area. All other details of management are left entirely to the *panchayat*. Where the area when under the management of the Forest Department yielded a net revenue, the rent fixed is always less than this. In some cases, no rent is levied and in others, it is charged for three years only. The ryots' forests mainly provide grazing and fodder but some of them are not unimportant as sources of fuel. In the Nellore district, for example, areas bringing in a revenue of some Rs. 40,000 a year, when worked for fuel, have been transferred to *panchayat* management, as have forests in the Coimbatore district which provide the Erode market with 500 tons of fuel annually. Many *panchayats* are attempting to develop the reserves handed over to them as sources of fuel supply and it is reported that there is a growing improvement in the protection of these reserves and in the interest taken by the villagers in limiting the number of cattle admitted to them, in enforcing the accepted grazing rates and in closing the reserves temporarily to improve pasture.

Speaking broadly, the large forest blocks in Madras are not so remote from close cultivation as they are elsewhere. The grazing in the forests which remain in the charge of the Forest Department is of great importance to the cultivator. In 1926-27, 15,769 square miles of these forests were open to grazing by all animals except goats, 849 square miles to all

animals except sheep and goats and 2,077 square miles were closed to grazing throughout the year. Occasionally, free grazing is permitted by rights under forest settlement or at the pleasure of Government; in other cases fees are levied, and may be charged at full rates or at privileged rates, or at enhanced or special rates, all of which again vary very considerably from district to district. The general policy is to charge twice as much for a cow as for a sheep, and twice as much for a buffalo as for a cow. The full rate for a cow generally falls between the limits of three and eight annas. A total of 1·81 million animals were admitted in 1926-27, mainly bullocks and cows and sheep, and the total revenue from grazing amounted to about 7·5 lakhs of rupees.

9. GENERAL EDUCATION.

Burma and Bengal are the only two provinces in which the proportion of literates is higher than it is in Madras. In the census of 1921, 21·4 per cent of the men and 2·2 per cent of the women in the Madras Presidency were returned as able to write a letter and read the reply to it. These percentages are for all parts of the presidency and, in estimating literacy in rural districts, allowance must be made for the comparatively high percentage of literacy in the city of Madras and other big centres of population.

The total expenditure on education in Madras was Rs. 453 lakhs in 1926-27, as compared with Rs. 217 lakhs in 1916-17 and Rs. 98 lakhs in 1906-07. The expenditure * on primary education for boys and girls was :—

	Rs. (lakhs)
1906-07	28·83
1916-17	70·13
1926-27	170·51

Of the total expenditure in 1926-27, forty-five per cent was met from provincial funds, fifteen per cent from local and municipal funds, twenty per cent from fees, and twenty per cent from subscriptions and other sources. Ten years before, provincial funds had provided thirty-six per cent, and twenty years before, only twenty-six per cent of the total expenditure.

The total number of male scholars in recognised institutions in 1927 was 1,920,000 of whom 1,713,631 were attending primary schools. If the primary school age is taken as from five to ten years, and the figures of the 1921 census are used for that age period, the percentage of boys of primary school age in Madras attending school in 1927 was 60.

The total number of female scholars in recognised institutions in 1927 was 521,000 of whom 500,300 were attending primary schools.

Calculated in the same way as for male scholars, the percentage of girls of primary school age attending primary schools in Madras in 1927 was 17.

* Excluding the cost of the inspectorate for which no separate figure for primary schools is shown

In addition to the figures given above, 81,000 males and 1,000 females were attending unrecognised institutions.

The following Table gives further particulars regarding male education in recognised educational institutions in the province :

Kind and number of institutions for males	Number of pupils	Percentage at each kind of institution	Cost per pupil.*
60 Arts colleges ..	12,200	0·6	184·3
10 Professional colleges	2,177	0·1	482·1
342 High schools ..	139,477	6·4	46·7
212 Middle schools ..	27,583	1·2	43·4
46,389 Primary schools ..	1,986,645	90·7	7·2
349 Special schools ..	21,797	1·0	171·2
47,362 Total ..	2,189,879	100·0	13·25

*Based on direct expenditure only.

At the head of the Madras educational system stand the Madras and Andhra universities. The Andhra University, which was constituted as recently as 1926, serves the Telugu-speaking area of the presidency. Both universities have a teaching as well as an examining or external side but the latter is at present predominant. The Madras University was founded in 1857 and is thus one of the three oldest universities in India. It has a faculty of agriculture and grants degrees in agriculture to students of the Coimbatore Agricultural College.

From the point of view of general rural education, the primary schools are of much more importance than the colleges and the high and middle schools. Primary education has received much attention of recent years. The principle of compulsion at the option of local authorities was introduced by the Madras Elementary Education Act of 1920, though but little progress has so far been made in either urban or rural areas as the local authorities have been reluctant to submit schemes under the Act mainly owing to difficulties of finance. By the end of 1926-27, only 21 out of 80 municipalities had introduced compulsory education. Three taluk boards have also introduced compulsion in selected areas. In 1924, a comprehensive survey of the educational position in all the taluks was carried out and one of its results has been the provision of a large number of schools in villages of 500 inhabitants and over which were formerly without them. In 1926-27, three hundred schools were opened under *panchayat* management as an experimental measure. Most of these schools are single-teacher schools. In Madras, as in other provinces, the rate of wastage between the first and second classes is disturbingly high. At present, 60 per cent of the children never get beyond the first class. Several causes contribute to this wastage, the chief of which are the indifference of the parents and the inefficiency of the single-teacher school. The pay of the teacher was increased in 1922 but still remains very low. A teacher in a lower elementary school under government management is still only on a scale of Rs. 20-1-30 per mensem, if he is trained, and if

he is untrained he receives only Rs. 15 per mensem. For the higher elementary schools the salaries are Rs. 25-1-50 and Rs. 20 per mensem, respectively. Endeavours are being made not only to increase the number of trained teachers but to improve their quality and, in 1923, the Union Mission Training School at Vellore started training teachers on lines somewhat similar to those of the Moga training school in the Punjab.

The education of the girl is of equal, if not greater, importance for rural welfare. While there has been steady progress of recent years in university education for women, the same cannot be said of secondary and primary education. A feature of female education in Madras is the increasingly large number of girls attending elementary schools for boys. In 1926-27, 298,632 girls attended boys' schools or more than 50 per cent of the total number of girls attending primary schools of any kind.

Up to the present, educational policy has been directed chiefly towards developing general education in the rural districts and far fewer experiments than in some other provinces have been made in the direction of providing a special type of agricultural education. The agricultural middle schools at Taliparamba and Anakapalle have been described in connection with agricultural education where it has also been mentioned that the institution of an alternative agricultural course in higher elementary and middle schools on the lines of the agricultural classes in the vernacular schools of the Punjab is under consideration. Under the scheme for practical vocational training in secondary schools, instruction in agriculture is given in four such schools.

Now that the introduction of machinery into agricultural operations and the development of rural industries is being more and more canvassed, the excellent training given at the Government Trades School in the city of Madras in mechanical and electrical engineering deserves mention.

It would not be proper to close this review of education in the Madras Presidency, brief though it is, without a reference to the remarkable educational work now being done under the direction of the Commissioner of Labour for the depressed classes who number about 6¼ millions out of a total population of 42·8 millions. Religious missions, philanthropic institutions and individual social workers all give their help and in the past five years no fewer than 783 schools have been started with a total strength of over 32,000 pupils.

Finally, whatever makes the country boy a better player as well as a better worker will also make him a better man and a better cultivator. It is, therefore, of good omen that the boy scout movement is steadily gaining in strength in the presidency and is now beginning to make its influence felt among the boys attending elementary schools in rural districts.

10. CO-OPERATION.

As in other parts of India, the co-operative movement in the Madras Presidency dates from the year 1904 when the first Co-operative Credit

Societies Act was passed by the Indian Legislature. But even before that date, the Government of Madras had realised the great possibilities of the movement and had, in 1892, deputed Mr. (now Sir Frederick) Nicholson "to study the theory and practice of the agricultural and other land banks in Europe and to suggest means by which a similar improvement may be popularised in India." The existence, in the presidency, of a number of successful indigenous institutions known as *nidhis*, which were similar to the Friendly and Building Societies of Great Britain, made the province a hopeful field for experiments in co-operation. Sir Frederick Nicholson submitted two reports of great interest and value in 1897-99 and, although no action on them was taken until the Act of 1904 was passed, they were instrumental in familiarising a number of people interested in the economic advancement of the community, with the ideas underlying the movement and the advantages to be derived therefrom.

The earlier rural societies were all credit societies formed for the purpose of giving the ryot financial accommodation for the purchase of agricultural requisites and of the necessaries of life and for the payment of government revenue. Progress was at first necessarily slow, as the work was more or less experimental. The ignorance and suspicion of the people, for whom the movement was started, prevented any great development in the organisation of societies. Another obstacle was the difficulty in getting the necessary funds to finance the societies. Most of the potential depositors lived in urban areas and could not be expected to have sufficient confidence in the newly formed village societies to entrust their money to them. The organisation of the Madras Central Urban Bank in 1906, and of four more financing banks during the next four years, led to the rapid growth of the rural credit societies in their neighbourhood. Reference is made below to the formation of additional central banks and to their influence on the acceleration of the rural credit movement in the presidency.

The growth of the agricultural movement is shown in the following statement :—

Year	Credit societies	Societies for purchase, production and sale	Other forms	Total
1904-05	8	....	....	8
1912-13	1,006	2	....	1,008
1917-18	2,271	19	....	2,290
1919-20	4,156	60	2	4,218
1921-22	6,206	79	4	6,289
1925-26	9,822	103	253	10,178
1926-27	11,000	132	304	11,436

(*Note.*—The majority of the societies of "Other forms" are societies for the acquisition or leasing of land for cultivation by members of the depressed classes.)

At the end of the year 1926-27, the co-operative movement, urban and rural, had a membership of about 833,000, of whom 497,940 were agriculturists.

These can be classified as follows:—

Non-cultivating landholders	52,650
Cultivating landholders	338,611
Tenants	63,378
Field labourers	43,301

It will be seen that the societies benefit not only ryots but also tenants and agricultural labourers. In the year 1926-27, the societies advanced to their members a sum of Rs. 236·5 lakhs, of which Rs. 144 lakhs was for productive purposes, Rs. 89·3 lakhs for reduction of prior debts and Rs. 3·3 lakhs for non-productive purposes Analysing these loans further, we find that Rs. 39·5 lakhs were advanced for cultivation expenses, Rs. 16·3 lakhs for the purchase of cattle, Rs. 13·8 lakhs for the improvement of land, and Rs. 10·5 lakhs for purchase of land. During the last twenty-three years, a total sum of over Rs. 14 crores has been advanced by co-operative credit societies to agriculturists at reasonable rates of interest and on easy terms of repayment. Of that amount nearly Rs. 9½ crores were given for productive purposes. The saving to the agricultural population in the shape of interest which the co-operative movement has made possible can be gauged from the fact that the rates of interest charged by societies vary from 9⅜ to 10 $\frac{15}{16}$ per cent as against the 12 to 75 per cent charged by moneylenders.

As has been pointed out above, the progress of the primary credit societies was considerably accelerated by the formation of central banks which have been able to attract a large amount of capital from the public. The number of such central banks, including the Provincial Bank, is now 32 and their working capital over Rs. 6 crores. The deposits which these banks receive at present are more than sufficient to meet their requirements, and, at the end of last year, there were large surpluses in many of the district banks as well as in the Provincial Bank, though these have since been somewhat reduced. There has been no increase in the number of such banks since 1921, as one central bank is usually sufficient to serve the needs of a district. The first few banks consisted entirely of individual shareholders who subscribed substantial amounts of money as the share capital. Now all the banks are of a mixed type, in which primary societies as well as individuals hold shares and both are represented on the directorate. The Madras Central Urban Bank, Ltd., which was the first central bank organised, has been converted into the apex bank for the presidency and its membership is restricted to district central banks and to individuals. The bank finances central banks but it has lent a very small fraction of its working capital to individuals against their deposit, a privilege which other central banks also enjoy.

Neither the rural credit societies nor the central banks have enough long-term capital to enable them to give sufficiently long-term loans for the liquidation of old debts or for land improvement. To overcome this

difficulty and to bring more long-term money into the movement, it was decided some three years ago to form a number of co-operative land mortgage banks. Fifteen such banks have actually been organised. The operations of each bank which is formed on the limited liability basis are restricted to a compact group of villages situated not more than five to seven miles from the bank's headquarters. The bank issues debentures for sale to the general public on the security of the landed property which the individual borrowers pledge to it. As the scheme is still in the experimental stage, Government have agreed to buy a portion of the debentures so issued.

One unsatisfactory feature in the working of the primary societies in the Madras Presidency has been the increase in overdue arrears in the last few years. Owing, however, to lack of uniformity in the method of calculating overdues in different provinces, it is not possible to compare accurately the position in the presidency with that in other provinces. In the case of primary societies, the percentage of the amount overdue to the demand under principal has increased from 31 in 1920-21 to 46 in 1926-27. As the increase was causing anxiety and in view of other considerations, a committee was appointed in 1927 to review the whole position of the co-operative movement and it has recently submitted a report to Government.

On the passing of the Act of 1912 which allowed societies for non-credit purposes to be registered, the by-laws of all credit societies were amended so as to enable them to undertake joint purchase of the domestic and agricultural requirements of their members as well as the joint sale of their agricultural produce. The local supervising unions were also authorised to act as agents for their affiliated societies in the matter of joint purchase and joint sale. The work of purchase and sale was entirely based upon indents received from members, the societies merely acting as agents. At the same time special societies called trading unions, were started in some areas for joint purchase and sale and attempts were made to supply them with all the necessary information and to place them in touch with wholesale merchants in Madras. Owing to the inadequacy of the official staff and the great difficulty in organising non-credit work, progress in this direction was slow. A stimulus to this branch of the work has, however, been given by the reorganisation of the upper controlling staff in 1925, and more organised work is now being done for the development of agricultural supply and marketing. A recent development which has made considerable progress has been the function of special societies known as crop loan societies or loan and sale societies to advance loans on the pledge of agricultural produce. Such loans are also given by the ordinary rural credit societies. The special societies advance money on the pledge of produce deposited with them for safe custody and for eventual sale. In 1926-27, advances were made on the pledge of produce to an extent of Rs. 9·34 lakhs. In order to remove one of the chief obstacles in the way of the development of these societies, Government have agreed to give long-term loans to a few of them to enable them to procure suitable godown accommodation. Another class of societies which deserves mention is that which deals with the

preparation of agricultural produce for the market and for the manufacture of certain agricultural requirements, such as bonemeal and other manures. Societies have also been organised for the hulling of rice, its preparation for the market, for the crushing of sugarcane and manufacture of jaggery, for the crushing of bones and phosphatic nodules and for the decortication of groundnuts. A recent addition to the non-credit movement in the presidency has been the co-operative agricultural demonstration societies, now thirteen in number, of which the society at Lalgudi in the Trichinopoly district was the first. These societies are organised for the purpose of demonstrating to the local agriculturists the value of the improved methods of cultivation, appliances, seed, and manures recommended by the Agricultural Department. A plot of land is taken on lease and is divided into two halves, one of which is cultivated on the old and the other on the improved system. All the work is done by the members or their employees under the guidance of the local officers of the Agricultural Department. The results so far have been very promising. A reference may here be made to the co-operative labour societies which secure work for small agricultural landowners, tenant cultivators and agricultural labourers during their slack time, by taking contracts from Government and local bodies for works which require mainly unskilled labour. There were 57 such societies in 1927, which secured for their members contract work of the value of nearly 7·5 lakhs.

There were also, on 30th June 1927, 109 building societies with 3,383 members and with a total paid-up share capital of Rs. 6·8 lakhs. These societies are given loans by the Government, ordinarily for 20 years, at six-and-a-half per cent interest. They lend to members at seven to seven-and-a-half per cent for the construction of dwelling houses. On June 30th, 1927, the total amount of government loans outstanding with these societies was Rs. 13·5 lakhs and about 1,000 houses had been built.

A dozen milk supply societies have been organised in the Chingleput district in the neighbourhood of the city of Madras. A union for these societies has since been formed and milk and curd prepared by them are taken to the city of Madras regularly in a motor lorry.

Societies for the depressed and backward classes are a special feature of the co-operative movement in this presidency. Last year there were 2,578 of these societies with a membership of 120,093. Their share capital and reserve fund exceeded Rs. 8 lakhs, and borrowings Rs. 18·3 lakhs. 1,600 of these societies are in the charge of the Labour Department.

As regards the question of future progress, while the organisation of agricultural credit societies is now largely in the hands of non-official agencies, these have not yet reached such a stage of efficiency that they can be solely entrusted with organisation, supervision and finance.

The supervision of credit societies has been taken over, during the last few years, by local supervising unions which have been specially organised for the purpose. The vast majority of rural credit societies are now linked up with these unions of which there are 366 in the presidency.

Each union consists of twenty to thirty societies usually within a distance of seven to ten miles. These unions are on the whole progressing fairly satisfactorily and in the more progressive areas are developing a considerable sense of responsibility as well as efficiency and business-like habits. They are federated into district organisations known as district co-operative federations which, besides co-ordinating and guiding the work of the unions, train the *panchayatdars* of the societies. Responsibility for the development of the non-credit movement remains to a very large extent with the departmental staff. There is also a Provincial Co-operative Union in addition to two other propagandist unions, the Andhra Sahakara Sammelanam at Rajahmundry and the Hood Co-operative Institute, Tanjore. These undertake the work of propaganda and training, but do no supervision.

The Director of Agriculture has in recent years attempted to treat the local supervising unions as his agents for the distribution of improved seed, manures and implements and has also used the co-operative movement for the multiplication and distribution of such seed, but with very limited success. Co-operation between the two departments is also secured by meetings of agricultural and co-operative officers in departmental and other conferences.

The staff of the Co-operative Department, excluding clerks and menials, consists of the Registrar, the Joint Registrar, 9 deputy registrars, 27 assistant registrars and 338 inspectors. In addition, the Labour Department has 67 inspectors doing co-operative work. The Joint Registrar, deputy registrars and 24 inspectors look after non-credit work. The cost of the department to Government last year was Rs. 7,29,636.

11. COMMUNICATIONS AND MARKETING.

The presidency is, on the whole, fairly well provided with transport facilities. Regular traffic along the coast is maintained by steamers between the chief ports, whilst on the east coast from Cocanada to Madras and further south, there is, for nine months in the year, an unbroken system of inland water carriage. As regards inland traffic, the area to the south of Madras is served by the South Indian Railway and to the north of Madras by the Madras and Southern Mahratta Railway. The open milage of railway during the year 1922-23 was, broad gauge, 1,718 miles; metre gauge, 1,993 miles; and narrow gauge, 123 miles. In addition to this, there are 275 miles of railway owned by the district boards of Tanjore, Kistna, Coimbatore, Guntur, Salem and Tinnevelly. Further construction is in progress.

The total milage of roads maintained by the Public Works Department is 1,096, and by local authorities 27,279; of these 20,275 miles are metalled and 8,100 are unmetalled.

Roads are classified under four heads :

(*a*) First class roads or trunk roads.
(*b*) Second class roads.
(*c*) Third class roads or other district roads.
(*d*) Other roads or taluk board and village roads.

Trunk roads are those which were originally Imperial roads and were maintained out of Imperial funds, trade routes or lines of through traffic between one district and another, or roads required for military purposes. The Government determine which roads shall be so classified and, since 1920, meet the actual expenditure incurred by local bodies on such roads, subject to a maximum of Rs. 500 or Rs. 1,000, per mile, according as the road is maintained by a district board or a municipal council. The total annual provision by Government on this account is Rs. 16·45 lakhs. The length of trunk roads is about 3,150 miles. In addition to trunk roads, some hill roads and the roads in the Agency tracts are constructed and maintained by Government.

For second class roads, which are not of the same importance as trunk roads but serve more than local needs, Government make a grant of half the cost of maintenance in rural areas, subject to a maximum for the whole district. Each district board determines for itself which roads should be included in this class. The length of roads so classified is about 12,460 miles and Government contribute each year a grant of Rs. 15·53 lakhs, provided that the total expenditure is at least double the amount of the grant. Collectors are required to make an annual report on the condition of the roads and, if it is considered that any of these are being neglected, the government grant is liable to be reduced.

When the classification of roads was made, it was intended that third class roads and village roads connecting the villages with the district roads should be made and maintained by the local boards concerned from their own resources. Local boards, however, have been able to spare very little towards this purpose and, in fact, village roads are little more than fair-weather tracks and seldom receive any attention whatsoever, and during the monsoon are impossible for vehicular traffic of any sort. As the result of a special representation, Government, since 1925, have been allotting annual grants of several lakhs to district boards for distribution among local bodies for the improvement of village communications, subject ordinarily to the condition that the local boards in each district should contribute from their own resources an amount equal to that allotted to that district. District board works are carried out by a Local Fund engineering establishment, consisting of a district engineer paid from provincial funds and of a subordinate staff paid from local funds.

The methods by which agricultural produce passes from the producer to the ultimate consumer are far from satisfactory. The cultivator suffers from many handicaps : to begin with, he is illiterate and, in general, ignorant of prevailing prices in the markets, especially in regard to commercial crops ; again, he is often indebted to the village merchant and moneylender and, therefore, is not free to market to the best advantage ; further, as pointed out above, communications are often defective and this makes the cost of transport unnecessarily high ; and, finally, he is handicapped by the lack of standardised weights and measures and by the numerous deductions to which he is subjected, either in the name of

charity and religion or over and above what might be regarded as the legitimate recompense of the middleman.

The keynote to the system of marketing agricultural produce in the presidency is the predominant part played by the middleman. There are different grades of middlemen in the case of different crops and, on the whole, they play a larger part in the case of commercial crops such as groundnut, cotton and jaggery than in the case of ordinary food crops. Their part varies, too, according to the economic condition of the cultivator. The rich ryot who is unencumbered by debt, and who has comparatively large stocks to dispose of, brings his produce to the taluk or district centre and sells it through a commission agent locally known as the *dalali* merchant. If it remains unsold on the day on which it is brought in, it is stored in the *dalal's* godowns at the cultivator's expense and as the latter cannot generally afford to wait about until the sale is effected, it is doubtful if, in many cases, he receives the full sale value. The middle class ryot generally disposes of his produce through the same agency but, unlike the rich ryot, he is not free to choose his commission agent, because he has usually taken advances from a particular *dalal* on the condition that he will hand his produce over to that *dalal* to sell. Not only, therefore, does he sell at an unfavourable rate but he pays a heavy interest, up to 36 per cent or even more, on his advances. His relations with the middleman are those of creditor and debtor, rather than of selling agent and producer. In almost all cases, the major portion of the produce of the poor ryot finds its way into the hands of the village moneylender. Whatever remains is sold to petty traders who tour the villages and the price at which it changes hands is governed not so much by the market rates as by the needs of the ryot.

In the case of commercial crops for export, such as groundnut, there is a long chain of intermediaries between the producer and the exporter. The exporting firms have no direct dealings with the producer. First in the chain comes the village merchant and moneylender, or the more well-to-do ryot, who buys at a cheap rate and charges heavy interest on advances; if he is in business on a substantial scale, he may sell direct to the brokers of the exporting firms; if not, he deals with the wholesale merchant in the town, who in turn does business with the broker of the exporting firm. Where producing areas lie close to towns, the wholesale merchant frequently takes the place of the village merchant.

It is the cultivator's chronic shortage of money that has allowed the intermediary to achieve the prominent position he now occupies. Where the cultivators are tolerably well off, as in the Kistna and Godavari deltas, his position is not by any means so strong. There, the ryot, once he has paid his land revenue (*kist*) keeps a very steady eye on the prices prevailing for rice imported from Burma, and is in no haste to come to terms with the agent or buyer if the terms do not suit him. The ultimate market for his produce (Madras city and the inland districts of Coimbatore and Salem) is close at hand; he sells his husked rice to local mill-owners

who hull it before passing it on, and who are at least as much concerned to keep their mills working as they are to beat down prices. Thus, in these deltas, the marketing of produce is on a reasonably satisfactory basis. The man who tills the land in the Cauvery delta is not in quite such a happy position, because much of the valuable land there is in the hands of a small number of large landholders, who lease out their land on the share system and who, therefore, accumulate the bulk of the surplus available, for export to Ceylon.

Forward contracts enter very largely into the system of marketing cotton. As in the case of groundnut, the producers have no contact with the larger exporting firms. The latter enter into advance contracts with local merchants for the supply of a definite quantity of cotton at a definite price. The element of speculation so introduced probably affects the cultivator but little in the long run, since the low price he gets in years of heavy outturn will be compensated by the higher price which the merchant will be forced to pay in years when the crop is short and the contract difficult to fulfil.

A Cotton Transport Act is in force in three tracts which produce well-known trade types of cotton (Northerns and Westerns, Tiruppur-Cambodia and Tinnevellies). The object is to maintain and improve the standard of the cotton in the protected areas by preventing inferior cotton being brought in. Previous to the introduction of the Act, merchants and middlemen intent on immediate profit had made a practice of importing inferior cotton with the object of mixing it with quality cotton and so obtaining a price approximating to that of the pure grade, or even of passing it off in its entirety as the genuine article. Under the provisions of the rules issued under the Act no lint, *kapas* or seed may be imported into these areas by rail or sea except under a license issued by the Director of Agriculture. The Act has not yet been applied to imports by road on account of the great difficulties of such control. As a result of the experience of the working of the Act, it has been found necessary to alter the regulations with a view to combine the Tinnevellies and Cambodia areas into one and to allow free movement of cotton seed without license, and it is proposed to take necessary legislative sanction to permit of this.

The sugarcane grower generally markets his produce as jaggery. A special system is in vogue in South Arcot where the East India Distilleries Company advances both setts and money to the cultivators, on the condition that the cane is sold to them.

Scattered up and down the presidency, at distances varying from ten to twenty miles, are innumerable weekly markets owned mostly by local bodies and, in some cases, by private individuals. These are the centres to which, week by week, the cultivators and their families flock in their hundreds to buy their day to day requirements which they pay for either in cash which they have brought with them, or from the proceeds of small lots of produce which they have brought for sale. In certain tracts, as for instance in the Agency and the Nilgiris, barter still lingers. In the

deltas, where practically nothing but rice is grown, the weekly market supplies all the other necessaries of life and, at the end of the day, there is generally a considerable accumulation of unhusked rice which finds its way into commerce through the medium of the agents of town brokers who are sent out to buy it. In areas where cropping is diversified and supplies the bulk of the food requirements of the local population, the markets are primarily centres at which small lots of produce of different kinds are re-shuffled, the buyer of one kind being the seller of another, and are therefore of little importance as centres from which large quantities of produce are sent out of the district.

12. LOCAL SELF-GOVERNMENT.

Local self-government in Madras is regulated by the provisions of the District Municipalities Act, the Local Boards Act and the Village Panchayat Act of 1920 and the Madras City Municipal Act of 1919. The local authorities are the municipal councils, district, taluk and union boards and the village *panchayats*. Separate district boards have not yet been constituted for the East and West Godavari districts, but, with this exception, the area under the district board is the revenue district, excluding municipalities of which there are eighty. The total number of district boards is 24 of which 15 have been granted the privilege of electing their own presidents. The maximum membership of a district board is 52. Not more than one-fourth of the members may be appointed by Government and the remainder, excluding presidents of taluk boards who are *ex-officio* members, are elected by taluk boards. In some districts, taluk boards have been constituted for each revenue taluk but more frequently the area of their jurisdiction corresponds to the revenue subdivision and comprises more than one taluk. There are now 129 of them. The maximum membership is restricted to 24, not less than three-fourths of whom are elected, the remainder being nominated by the president of the district board. Union boards, of which there are 486, may be constituted for villages with a population of 5,000 and over and such bodies exist in all districts except the Nilgiris and South Kanara. Membership is restricted to a maximum of fifteen, not less than three-quarters of whom are elected by the taxpayers, the remainder being appointed by the president of the district board. The Madras Local Boards Act of 1920 defines the powers of supervision and control which may be exercised by district boards over taluk boards and by district and taluk boards over union boards. The main source of income of the district and taluk boards is the land cess of one anna in the rupee of the annual rental value of all lands in the district which is shared equally between the taluk board concerned and the district board. In addition, the district board is empowered to levy, for district board purposes alone, an additional cess of three pies in the rupee as is the taluk board for its own purposes. The other sources of income of the district board are tolls on carriages, carts, and animals, taxes on professions, companies and pilgrims, rents from fisheries and fees for the use of markets, cart-stands and slaughter-houses. The income of the union boards is mainly derived from a tax on houses which is levied in all unions.

As elsewhere, the ordinary duties for which local boards are responsible are the construction and maintenance of roads, bridges, hospitals, dispensaries, markets, waterworks, wells and drains, the training of nurses and vaccinators, sanitation and the diffusion of education. Elementary education in Madras is governed by the provisions of the Elementary Education Act of 1920 under which district educational councils are constituted. These councils consist of a president and such members as the Government may prescribe. The president of the district board is an *ex-officio* member of the council and the district board is entitled to elect an additional representative. Municipalities and taluk boards are also entitled to elect representatives. An elementary education fund is constituted for each municipality or taluk board area, the main contributions to which are grants from Government and the proceeds of a tax not exceeding twenty-five per cent of the taxation leviable under the heads, land cess, tax on companies, profession tax and house tax in taluk board areas and property tax, tax on companies and profession tax in municipalities. Where this taxation is levied, as it now is by 93 taluk boards out of 129, the Government make an additional grant of an equal amount.

The functions and the sources of income of the village *panchayats* are very similar to those of the larger bodies. The local Government may also entrust to them the management, protection and maintenance of village forests and the protection, maintenance and management of irrigation works. The *panchayat* movement appears to be gaining in strength. No less than 991 of them were constituted in 1926-27, bringing the total number at the close of that year up to 1924.

13. PUBLIC HEALTH AND SANITATION.

A visitor to Madras who is acquainted with agricultural communities in western countries cannot fail to be impressed with the generally poor physique of the Madras cultivator. The average expectation of life for a male at birth is 26 years and for a female 27·5 years; and the expectation of life in Madras is markedly higher than in any other province in India, excluding Burma.

The problems which confront those whose work it is to seek to improve the general health of the community are many and complex. They originate primarily in the conditions under which the villagers, who constitute nearly 88 per cent of the total population, live. Dwelling houses are badly constructed, devoid of light and ventilation. The houses of the very poor (and these unfortunately form the great majority) harbour both the human and the cattle population under the same roof; and cowdung and house refuse are accumulated in the close vicinity of the houses. In villages which have more than one source of water supply, no particular well or tank is reserved exclusively for drinking water and pollution by washing, bathing and by animal and human organic matter is universal. No system of drainage is in practice, with the result that pools form in every depression during the rainy season and stagnate in the hot weather. Of sanitary arrangements there are almost none so that

the soil in and around the village becomes polluted and all waterways are a positive danger. For medical assistance a villager may have to travel miles to the nearest dispensary, unless he is prepared to entrust himself to the administration of the " quack ". Little wonder, then, that the deaths from preventible diseases reach appalling figures. Of these, the most violent and the most dreaded—cholera, small-pox and plague—are not the most dire in their results. A far heavier toll is taken by diseases like fevers and dysentery, not only in the number of deaths for which they are responsible, but in the general enfeeblement and consequent lowering of productive capacity which they leave in their train. A large proportion of the deaths registered under fevers is ascribed to malaria. People are well aware of the value of quinine as a specific against this disease and, were it available in sufficient quantity and at a price within the means of the people, it would be widely used. But in present conditions, the cost of any scheme of general distribution is prohibitive.

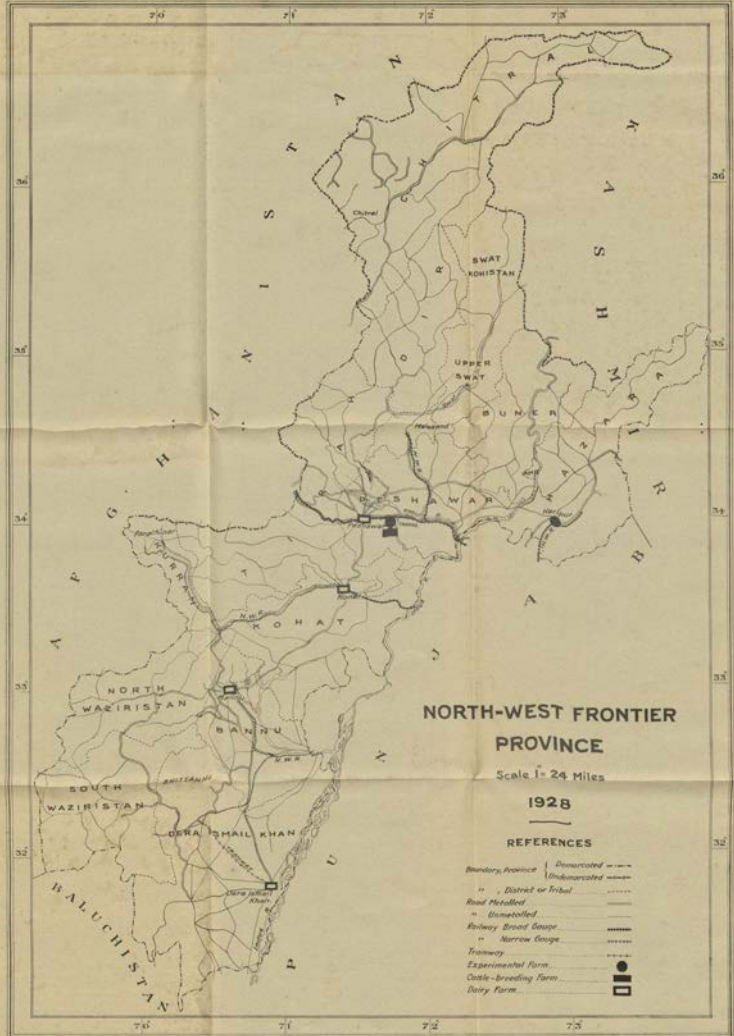
Figures are available which show that in the wet districts, especially where rice cultivation is the main occupation, eighty to a hundred per cent of the people are heavily infected with hookworm. This disease, though not immediately fatal, steadily undermines the physique of the population as do fevers and dysentery. Tuberculosis is believed to have increased rapidly within the last two decades, though accurate statistics are not available. Finally, the proportion of deaths in maternal cases is four times as high as it is in England, and, little wonder, in view of the fact that for every 1,000 births registered in 1927, only 55 women received skilled attention during labour.

Such is, in brief, an indication of the problems which lie before the Public Health Department. It remains to describe how these problems are being tackled.

Prior to the introduction of the District Health Scheme in 1922 and 1923, no co-ordinated system of public health administration existed. Separate organisations there were, each under separate control. The Collector was responsible for plague measures, the Director of Public Health for cholera, and the vaccination staffs were controlled by local bodies. From 1923, three assistant directors of public health have each been placed in charge of a bureau in the office of the Director. A trained health officer is entrusted with the public health administration of each district, and each taluk has at least one health inspector who is under the supervision and control of the district health officer. The strength of the district staff in 1927 was 25 health officers and 252 inspectors. All these officers are government servants, whose services are at the disposal of local bodies for carrying out the provisions of the Local Boards Act, 1920. The salary of all health officers is paid by Government, but, in the case of municipal health officers, twenty-five per cent of the average cost of the posts, together with the proportionate leave and pensionary contribution, is recovered from the municipal councils. The whole expenditure in connection with the prevention of epidemics and for the improvement of sanitation is a charge on the local bodies. Briefly, the organisation is concerned with the investigation and control

of epidemic disease, with vaccination, inoculation, improvement of vital statistics, with the drawing up of plans and estimates for sanitary projects and with systematic health propaganda. About two million people are being vaccinated every year, a rate of progress which foreshadows the day when small-pox will no longer be a serious menace to the presidency. Prompt measures in regard to outbreaks, and the efficient sanitary control over fairs and festivals, have resulted in minimising the spread of cholera, and outbreaks of relapsing fever in 1922-23 were speedily stamped out. The hookworm problem is being tackled by a special branch subsidised by the International Health Board of America. A comprehensive scheme of health propaganda has been embarked upon. During 1927, 70,300 lectures were delivered in 44,200 centres to about 3,800,000 people, and some lakhs of posters and leaflets dealing with health subjects were issued; in some cases, local bodies were provided with magic lanterns and slides; miniature health exhibitions were held, and in 3,500 schools, lectures, dialogues and dramas were given. Perhaps the most potent of all propaganda measures has been the inauguration of the "National Health and Baby Week"; and it is worthy of mention that the Bellary exhibition in 1927 was awarded the Empire prize for child welfare schemes. The "weeks" are run according to a model programme drawn up by the Director of Public Health. The movement has appealed to the general populace in an extraordinary manner, substantial evidence of which is forthcoming in the increasing volume of funds raised by private subscriptions.

With regard to medical relief, a scheme has recently been introduced, the aim of which is to induce medical practitioners to settle in rural areas. A subsidy of Rs. 600 or Rs. 400 is granted for one year, according to whether the practitioner holds a degree or a diploma. In addition he is given Rs. 360 for drugs and Rs. 100 if he retains a qualified midwife. Two hundred such practitioners have now been installed and the result of the experiment will be watched with keen interest.


NORTH-WEST FRONTIER PROVINCE
Scale 1 - 24 Miles
1928
REFERENCES
Boundary, Province Demarcated
Undemarcated
" , District or Tribal
Road Metalled
" Unmetalled
Railway Broad Gauge
" Narrow Gauge
Tramway
Experimental Farm
Cattle-breeding Farm
Dairy Farm
AFGHANISTAN
KASHMIR
PUNJAB
BALUCHISTAN
CHITRAL
SWAT KOHISTAN
UPPER SWAT
BUNER
PESHAWAR
KURRAM
KOHAT
NORTH WAZIRISTAN
BANNU
SOUTH WAZIRISTAN
DERA ISMAIL KHAN
Chitral
Malakand
Kohat
Bannu
Dera Ismail Khan
N.W.R.
BHITTANNI
LOWER SWAT
Indus R.

NORTH-WEST FRONTIER PROVINCE

1. GENERAL FEATURES AND NATURAL DIVISIONS.

The North-West Frontier Province, as at present constituted, came into existence in 1901. In that year the districts and tribal tracts now included in the province, which had till then been under the control of the Punjab Government were made a separate charge and placed under a Chief Commissioner and Agent to the Governor General in direct subordination to the Government of India in the Foreign Department. This step was taken in consequence of the decision of His Majesty's Government "that the conduct of external relations with the tribes on the frontier should be more directly than heretofore under the control and supervision of the Government of India."

As its name denotes, the province is situated on the north-west frontier of the Indian Empire. In form, it is an irregular strip of country lying north by east and south by west. On the north it is shut off from the Pamirs by the mountains of the Hindu Kush. To the south it is bounded by Baluchistan and the Dera Ghazi Khan district of the Punjab; on the east by the Kashmir State and by the Punjab, and on the west by Afghanistan. Although the district of Hazara and part of Kohistan are cis-Indus and the trans-Indus tahsil of Isa Khel is included in the Mianwali district of the Punjab, the province may generally be defined as the tract of country north of Baluchistan, lying between the Indus and Afghanistan. Its greatest length is 408 and its greatest breadth 279 miles. The area of the five districts under regular administration, Hazara, Peshawar, Kohat, Bannu and Dera Ismail Khan, is 13,193 square miles which is roughly about twice the size of Yorkshire.

To the north and west of these districts is the tribal territory, some 25,472 square miles in area. It is separated from Afghanistan by a boundary line known as the Durand line, named after the late Sir Mortimer Durand, the British plenipotentiary who negotiated the agreement of 1893 with Afghanistan, in accordance with which the demarcation of the boundary, for the greater part of its length, was carried out in 1894.

The total area of the province is 38,665 square miles. The population of the five districts as enumerated at the census of 1921 was 2,251,340. No census of population has ever been taken in the tribal tracts. Only estimates based on the fighting strength of the clans are available. On the basis of five persons to a family consisting of one combatant and four dependants, one woman and three children, the tribal population is estimated at 2,770,666. On this calculation the population consisted of 554,133 men and 2,216,533 women and children in 1921. If an allowance is made for the old and infirm among men, the active fighting strength of the tribes may be put down at 400,000.

The population of the tracts is entirely, and of the districts predominantly, Muhammadan. The proportion of the Muhammadans is ninety-five per cent in Hazara, ninety-two per cent in Peshawar and Kohat, eighty-nine per cent in Bannu and eighty-four per cent in Dera Ismail Khan. Agriculture is the chief occupation of the population in the settled districts.

In the tribal tracts, the exiguous agriculture and pastoral pursuits are diversified by internal feuds, raiding and occasional warfare.

For the quinquennium ending 15th June 1926, the total cultivated area, including fallows, of the five districts including the revenue-paying portion of the North Waziristan Agency amounted to 3,179,000 acres or practically one-third of the total area of the districts. No land revenue is levied in the bulk of the tribal territory. Consequently no figures of the cultivated area are available.

The province falls into three geographical divisions :—

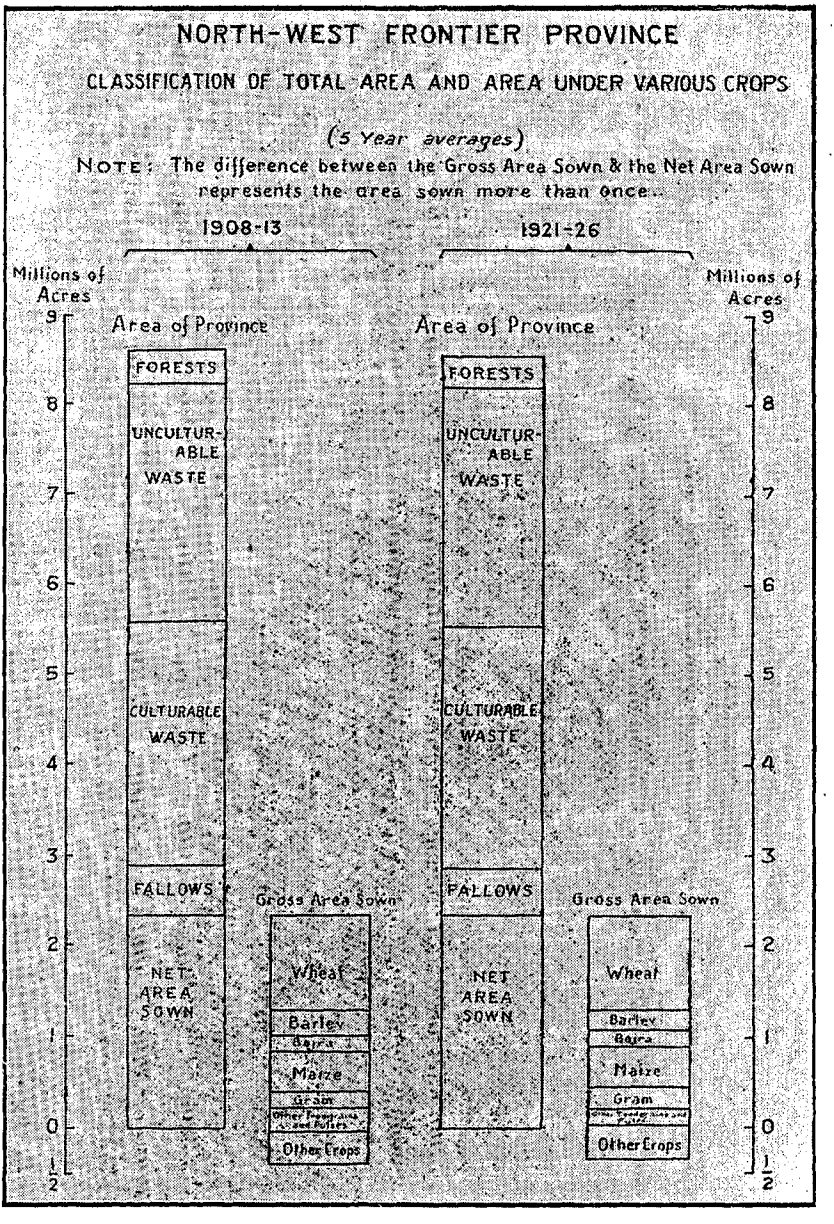
(*i*) the cis-Indus district of Hazara ;

(*ii*) the comparatively narrow strip between the Indus and the hills, constituting the districts of Peshawar, Kohat, Bannu and Dera Ismail Khan ; and

(*iii*) the belt of territory of varying width extending from the Gomal (or Gumal) Pass in the south to Kashmir in the north. This is generically known as the Independent Territory.

2. THE LAND AND THE PEOPLE OF THE FIVE SETTLED DISTRICTS.

(*a*) *Hazara*—Hazara is the most northerly district of British India. It lies at the base of the Himalayas, its apex running up as a wedge between Kashmir and the mountainous regions that drain into the Upper Indus. Its extreme width from east to west is 50 miles and length from north to south, 120 miles. It comprises three tahsils, Mansehra, Abbottabad and Haripur, which occupy its northern, central and southern portions respectively. Including Feudal Tanawal, the total area of the district is 2,985 square miles. It is bounded on the east by the Kashmir and Poonch States, on the west it marches with the independent territories of Kohistan, Allai, Nandihar and the Black Mountain and, further south, with the territory of the Utmanzais and other trans-border tribes and finally with a portion of the Swabi tahsil of the Peshawar district. On the northern boundary of the district lie Chilas and part of Kohistan and the southern is the administrative line that separates it from the Attock and the Rawalpindi districts of the Punjab. The mountain ranges, which run down either side of the district, with a trend generally from north-east to south-west form its leading physical feature. The space between the mountainous ranges is occupied by a series of level tracts of varying size and character. Of these the principal are (1) the Pakhli plain in the Mansehra tahsil, which is 3,000 feet above sea level and in extent is 11 by 10 miles ; (2) the Mangal tract in Mansehra, less open and more broken than the Pakhli tract, with a fertile soil of deep loam but no irrigation to speak of ; (3) the Orash or Rash tract in the Abbottabad tahsil, four miles in extent either way, with the appearance of having once



To face page 276

been a great lake. It is famous for its maize. The Mangal and Orash tracts are both about 4,000 feet above sea level; (4) the Haripur plain, the largest of the plains tracts, thirty-two miles long and twelve miles wide. Its altitude gradually descends from 3,000 to 1,600 feet. The Dor flows through its northern part and irrigates land of great fertility on either side. The lower part of the plain is unirrigated and seamed, here and there, by deep ravines.

The rivers flowing through the district are (*i*) the Siran, which irrigated 6,273 acres in 1907, of which 4,671 acres were in the Mansehra, 143 in the Abbottabad and 1,459 in the Haripur tahsil; (*ii*) the Dor, which has much less water than the Siran but commands more than double the area; it irrigated 1,133 acres in the Abbottabad tahsil and 13,713 acres in the Haripur tahsil in 1907, tracts which are rich in crops of sugarcane and turmeric; (*iii*) the Harroh which rises in the Dunga Gali range and has two branches, the eastern known as the Dhund and the western known as the Karral Harroh. It irrigated 3,200 acres, chiefly in the Panjkatha tract. About 21,400 acres were irrigated in 1907 from *kathas* which are small tributaries of the main streams mentioned above.

Hazara is a district of varied characteristics, with alternations of hill and plain, vegetation and barrenness, dry soil and moist. The rainfall varies, from an annual average of 30 inches in Haripur to one of 47 inches in Abbottabad and 36 inches in Mansehra. Two-thirds of the amount falls in the hot weather, April to September and the remainder is received in the cold weather, October to March. The northern portions of the district are uninhabitable in winter on account of snow. The summer climate is temperate, especially in the northern part of the district. In the southern part, round Haripur, it resembles that of the northern Punjab. The heat in the lower hills can be fierce. In the more elevated tracts, in Abbottabad and Mansehra, the charm of the hills is enhanced by the beautiful climate. The Kagan Valley is superb in the beauty of its scenery. The area cultivated in the Mansehra tahsil amounted in 1921 to sixteen per cent and the area irrigated to two per cent; in the Abbottabad tahsil, the cultivated area was thirty per cent and the irrigated area one per cent; and in the Haripur tahsil, thirty-six per cent and five per cent of the total area were cultivated and irrigated respectively.

Maize is the principal crop, 41·2 per cent of the cultivated area being under it. Wheat comes next, with a percentage of 27·8 followed by barley with a percentage of 7·9. *Juar, bajra* and other cereals take up 16 per cent.

Excluding Feudal Tanawal, the rural population amounted to 560,000 in 1921.

Besides agriculture, the people derive a considerable income from their livestock, mainly cattle and flocks of sheep and goats. At the settlement of 1907, the annual profits from livestock were estimated at eleven lakhs of rupees, including five lakhs of rupees for *ghi*. Forests are another

important source of income of the people. The management of village forests is under the supervision of the Deputy Commissioner to whom it gives endless trouble.

Government service, both military and civil, brought in an income to the people of over eight lakhs of rupees in 1907. At the present time, the amount must be considerably greater.

The principal tribes of the district are Awans, Gujars, Tanaolis, Swatis, Pathans, Gakhars, Khanals, Dhunds, Mishwanis and Saiyids. Of these, the Tanaolis, Awans, Gujars and Mishwanis are the best agriculturists. The others are of average or indifferent quality. But where the struggle for existence is severe, even the Saiyids will become thrifty and industrious.

Pashto is spoken by Pathans who are in a minority in this district. The language of the bulk of the people is Hindko which is a dialect of Western Punjabi.

The Hazara peasant is enterprising and travels far afield in search of employment. He has not, however, the manliness of the Pathan or the sturdy independence of the Punjabi Muhammadan of Rawalpindi and Jhelum.

(*b*) *Peshawar.*—The four districts lying between the Indus and the hills form a compact group and are generally classed together. The Peshawar district has an area of 2,607 square miles. Its population, at the census of 1921, was 907,367. On the east, Peshawar is separated from the Hazara and the Attock districts by the Indus. On the south-east, the Nilab Ghasha range divides the district from Kohat. Elsewhere the border of the district marches with the territory of the Pathan hill tribes, who are now all within the sphere of British influence. To the south-west lie the Hassan Khels and Pass Afridis ; to the west, the Akko Khel and Bassi Khel Afridis, the Khyber Afridis and Mullagoris. Further north across the Kabul river, the Tarakzai, Halimzai, Burhan Khel and Isha Khel Mohamands hold the border hills and carry the frontier on to the Swat river. The northern boundary of the district marches with the territory of (1) the Utman Khel, (2) the Ranizais of Swat, (3) the Buner Yousufzais, (4) the Khudu Khel, (5) the Gaduns, and (6) the Utmanzais.

The greater part of the district is a valley surrounded by rugged and barren hills. The rainfall is scanty and falls mostly in the cold weather. It could not have been greater in early days, as the Buddhist wells still in existence are as deep as those now constructed.

The climate from June to September is exceedingly hot and trying and resembles the heat of the Red Sea. Malaria is rife in the autumn. The irrigated portion of the valley is notoriously unhealthy. The cold in the winter is intense.

The rivers and minor streams form the source of supply of numerous canals which now interlace the whole of the western half of the district and thus counteract the deficient rainfall, so far as cultivation is concerned. The rivers which affect the agricultural conditions of the district

are (*i*) the Swat, and (*ii*) the Kabul. The Indus is not tapped for irrigation. The principal minor streams are (*i*) the Bara from the Afridi Hills, (*ii*) the Makam, and (*iii*) the Kalapani Nalas in Yousufzai.

Mr. (now Sir) Louis Dane, writing, in 1898, as a Settlement Officer remarked of the Lower Swat Canal that it had changed the character of the tract, which before the introduction of the canal was merely an arid high-lying upland. The canal has been an enormous boon to landowners. The Kabul River Canal, dug in 1885 at the suggestion of Mr. Tucker, the Deputy Commissioner, was considerably improved in 1891 at the instance of Mr. Merk, another Deputy Commissioner. It irrigates a considerable area of the richest lands in the Peshawar and Nowshera tahsils. The Upper Swat Canal has now proved a financial success. Its working in the year 1926-27 resulted in a profit of 6·24 per cent on the capital invested against a percentage of 1·77 during 1925-26. Civil canals, a term which embraces minor canals constructed either by government or private enterprise and controlled by the Deputy Commissioner of Peshawar, play a very useful part in irrigation. Irrigation from wells is resorted to, more especially in the eastern half of the district, that is, the Swabi and Nowshera tahsils. In Yousufzai the soil is sufficiently firm to admit half the wells being worked without a complete masonry lining. The area served by a well is kept down by the curious custom of distribution of the village lands between the sharers in strips. A certain amount of irrigation is obtained from springs below the Afridi hills in Peshawar and in Baizai and in the east of the Swabi tahsil. The area irrigated by government canals amounted to 368,058 acres in 1925-26.

The population of the district has increased. In 1868 it was 441,000, in 1881, 517,000. In 1891, it had grown to 704,000. In 1901 and 1911 the numbers were 788,000 and 865,000. At the census of 1921 the figure stood at 907,000.

Pathans form the bulk of the population. The non-Pathan population consists of tenants and village servants. The tenants are chiefly Hindki Awans and Gujars mainly in Yousufzai; Malis, east of Swabi and Nowshera and Baghbans scattered all over the district.

The first Pathans to invade the district appear to have been the Dilazaks, who made themselves masters of the whole tract at some time between the tenth and fourteenth centuries. The Yousufzai and Gigiani clans of the Khakhai stock in combination with the Muhammadzais and Usman Khels ousted the Dilazaks, who fled across the Indus at the close of the fifteenth century. The tract was partitioned among the conquerors. The Gigianis received the Doaba; the Muhammadzai, Hashtnagar and the Yousufzai, the whole country to the east as far as the Indus. Subsequently the Yousufzai conquered Swat and Buner. In the tribal re-adjustment the Yousufzai proper moved to the hills in the north and assigned their share in the district to their kinsmen of the Mandan subdivision of their tribe. The remnants of the Dilazaks were dispossessed by the Khalil, Mohmand and Daudzai clans of the Ghorey Khel and by the Khattaks, who emerged from the hills to the south-west and established themselves in the eastern portion of Nowshehra. The defeated

and despoiled Dilazaks are now hardly to be found in the district, and are not recognised as true Pathans by the other tribes. The district is still held as it was originally parcelled out amongst the invaders in the seventeenth century, except for an extension of the Khattaks across the Kabul river as a result of their raids against the Mandans, who had to surrender their southern villages and some portions of the Baizai Valley to the Khattaks and some to the Utman Khel as the price of their help. The Pathans of the district are a lively people, proud, brave and hospitable, three prominent virtues which cover a number of other traits. Their pride is a marked feature of their character.

The three principal elements in their code of honour, the Nang-i-Pakhtana, specially among the Pathans not under regular British administration, are (1) *nanawatai*, or "the entering in," according to which the Pathan is expected to give asylum and to protect, at the cost of his life, even his own enemy, should he seek the shelter of his roof in his extremity; (2) *badal* and *kisas*, or the law of an eye for an eye and a tooth for a tooth; (3) *mailmastai*, hospitality to any traveller arriving at his house and demanding it. Hospitality is popular and a saving man is looked down upon as a *shum* or a miser.

Under the peace and security of a settled government, these distinctive customs are disappearing. The Pathan like most other people is gradually being rounded into shape like the pebbles carried in a river. Crime, mostly connected with *zan*, *zar* or *zamin*, *i.e.*, woman, money or land, is decreasing. The Pathan readily enlists in the army. The language of the people has two dialects, the hard northern and the soft southern. Books are few; poems many, in the language. Their great poet has been Khushal Khan Khattak, poet and patriot, chief and warrior. He led them against the Moghuls with success. In a poem full of spirit, he has chastised the Yousufzai for their baseness in deserting the Pathan cause on the field of battle. Khushal Khan had a good opinion of himself, as he has recorded that he was grateful to God for many things; but, above all, for the fact that he was Khushal Khan Khattak.

The old Pathan custom of *khula vesh** (periodical distribution of land and even of houses on the basis of mouths) among the male adult population on the most naked principles of socialism has fallen into desuetude in this district, as a result of the introduction of settled government and the spirit of its institutions. Irrigation has completed the process and washed out the last traces of *vesh*.

Except near Peshawar and in parts of Swabi tahsil, the pressure of population on the soil is not heavy. The total cultivated area is 882,968 acres, the number of holdings 396,885, and the average size of the holding is 2·2 acres. The density per square mile of the cultivated area is 607.

Occupancy tenants are rare except in Mardan. Tenants-at-will generally pay produce rents. The proportion is usually one-half and sometimes three-fifths of the produce. On the Lower Swat Canal, the owner

* Khula Vesh literally means "mouth distribution."

either takes half the produce and pays the canal rates, or one-fourth and leaves the tenant to pay the canal revenue. On lands irrigated by wells the owner's share varies from one-third to one-half. On unirrigated lands the owner's share may be from one-fourth to one-sixth and for poorer soils may fall from one-sixth to one-tenth or even one-twelfth of the produce. The percentage of cultivated area under tenants is high in Charsaddar, Peshawar and Mardan and low in the tahsils of Nowshera and Swabi.

The *kharif* staples are cane, cotton, maize and rice, and the *rabi* crops are wheat, barley and tobacco. Tobacco is a speciality of the eastern half of Yousufzai and is generally grown on lands irrigated by wells.

Berseem or Egyptian clover is spreading in the Peshawar Valley. More cuttings are obtained if the sowing is done in the third week of September than when it is delayed.

(c) *Kohat.*—The Kohat district is the central of the five districts of the province. It occupies most of the wild hilly country lying between the fertile plains of Peshawar to the north and of Bannu to the south. On the west, the district adjoins the country of the Wazirs. To the north-west lies the country of the Zaimusht and Orakzai tribes. Farther east, the hills north of the town of Kohat divide British territory from the country of the Sipaiah and Bizoti Orakzais and the Adam Khel and Jowaki Afridis, while on the Indus, the Nilab Ghasha range separates the Kohat and Peshawar districts.

The district is wedged in between the Indus and the Kurram rivers, with the province of the Punjab on the east and the semi-independent Afridi, Orakzai and Wazir tribes on the north and west.

The area of the district is 2,694 square miles, of which 460 square miles or about one-sixth are under cultivation ; 350 square miles are classed under culturable waste and 1,900 square miles, or seventy per cent of the whole, consist of bare hills, arid rocks and deep ravines, all combining to form a dreary picture of barren desolation. For administrative purposes the district is divided into three tahsils, Kohat, Teri and Hangu.

The sterner features are particularly marked in the Teri tahsil and the Kohi and Shakardarra tracts of the Kohat tahsil, known as the Khattak country. This tract is entirely dependent on rainfall, with only 2,300 acres irrigated out of 206,000 acres under cultivation. About forty-two per cent of the cultivation in this tract is under autumn crops, of which *bajra* is the principal. Among the *rabi* crops, wheat and gram occupy more than half the cultivated area.

The soil is a good sandy or stony loam, light, cool, clean and wonderfully retentive of moisture. *Kharif* crops are liable to failure. Spring crops, if assisted by moderate winter rains, are abundant and general failure is rare.

The rest of the district is known as the Bangash country. It includes the China and Toi circles of Kohat tahsil, which are fairly open and fertile plains and yield excellent crops of maize, rice, wheat and barley.

Nearly sixty per cent of these crops are protected by irrigation from springs, streams and other sources. The Miranzai valley forming part of Hangu tahsil is picturesque and fertile.

The rainfall in the Bangash tract is more favourable than in the Khattak country. The soil, however, is stiffer and crops show the effects of a drought quickly. Agriculture in the Bangash tract is more varied and complex than in the dry Khattak tract. Maize, *bajra*, *mung*, rice and cotton are the principal *kharif* crops. The *rabi* crops are wheat and barley. Gram is unsuitable on account of the stiffer texture of the soil. More reliance is placed on *kharif* than on *rabi* crops.

The Teri tahsil and the Kohi and Shakardarra tracts of the Kohat tahsil are the home of the hardy, martial and enterprising Khattak race, who own nearly two-thirds of the district and form one-half of the total population. The sterling qualities of endurance, enterprise and courage have won for the Khattaks a high place among the Pathan tribes. These qualities are largely the product of their healthful but barren environment, which has compelled them to seek a livelihood as soldiers, from Gilgit to Hyderabad and from Quetta to Mandalay.

The Hangu tahsil and the more favoured portions of the Kohat tahsil (China and Toi) are inhabited by the Bangash, who entered the district from the Kurram valley and gradually displaced the Niazi Pathans, the Awans and other Hindki folk. Along the western border of the district, there are a few settlements of Afridis, a few of whom hold land as owners and many as tenants. The Bagash of the Upper Niranzai valley are, as agriculturists and fighting men, like the Khattaks. In Kohat and the Lower Miranzai valley, which are favoured by nature, they are softer, more indolent and less manly, as a result of easier conditions. The Pathan feelings of jealousy, faction and hereditary feuds, however, pervade all alike. Compared with other tracts in which security has lessened the need for common action and has loosened the tribal and village bonds, there is, in the district as a whole, much of the old cohesion still existing.

At the census of 1921, the population of the district was 214,123. Those dependent upon agriculture are exclusively Muhammadans, of whom no less than seventy per cent belong to the Pathan tribes.

The democratic organisation of the Pathans has reflected itself in the agriculture of the tract. The typical features of purely Pathan tracts are (*i*) a numerous class of small peasant proprietors, (*ii*) few large holdings, (*iii*) no tenants, and (*iv*) little necessity for village menials.

The district does not produce enough to feed itself. Alternative sources of income have, therefore, to be found, the principal among which are: (*i*) military service; (*ii*) raising of livestock, chiefly cattle, sheep and goats; (*iii*) the carrying trade in salt and grain; (*iv*) sale of the products of the dwarf palm; and (*v*) rent and wages from the exploitation of the salt mines.

Military service is the most secure and lucrative source of income. Some of the border villages enjoy remissions of land revenue for service in border defence.

Mr. (now Sir) Michael O'Dwyer in reviewing the Settlement Report of the district, from which much of the information is incorporated in this sketch, observed in 1905 that one of the greatest needs of the district was to conserve the scanty rainfall, which runs off uselessly into the Indus, and that the policy of actively helping the people had yielded good results and should be steadily pursued. Conservation of the rainfall is a necessity if the resources of the people are to be strengthened. "There are four good things in life," says a Pathan proverb, "river water; wheat on unirrigated land; weeping (wet) rice and the strength of a young man." It shows what value the Pathan attaches to water, the prime factor in his husbandry.

(*d*) *Bannu.*—The Bannu district is a level plain, almost circular in shape and enclosed on all sides but the north-east by a rampart of bare hills. It is bounded on the north by the hills of Waziristan, on the east by the Kohat district and the Mianwali district of the Punjab, on the west by the Wazir and Bhittani hills, and on the south and south-west by the Dera Ismail Khan district. Its extreme length from north to south is 52 miles and its extreme breadth from east to west 34 miles. The district is divided into two tahsils, Bannu, the northern, occupied by the Bannuchis and Wazirs, and Marwat, the southern, the home of the Marwat tribe. The Bannu plain falls into four natural divisions, central Bannu, the Thal, southern Marwat and the western plain. Two rivers, the Kurram and the Tochi, known in Marwat as the Gambila, flow through the district. The volume of water in the Tochi is steadily becoming less and less. There are a number of hill torrents. The principal ones running into the Kurram are Barganathu or Adhami, the Kashu, the Gangu Nariwah, and the Shinawah. Those which cut their way into the Gambila are the Baran or Lohra, the Khaisora, the Shaktu, the Sawan, the Varmola, the Nugram, the Kharoba, the Lohra and the Chunnai. These torrents have produced a network of ravines, which is spreading year by year. No benefit is derived from their waters. On the contrary, they bring actual loss.

Agriculturally, the district falls into two subdivisions, one of which is irrigated and the other unirrigated. The irrigated tract occupies one-sixth of the total area, and one-fourth of the area cultivated, maintains two-thirds of the population and is responsible for more than three-fifths of the total land revenue assessment. The main sources of perennial irrigation are (1) the Kurram river, and (2) the Lohra canals. The Kurram canals are of great antiquity. Their design is faulty; natural drainage is often blocked and considerable areas become waterlogged. The general management of canals is in the hands of the Deputy Commissioner. The distribution of water is regulated on the basis of custom. In the west of the district, dams are often placed across hill torrents and divert their floods to embanked fields. Three floodings ensure a magnificent crop. But floods are uncertain and sometimes in their fury they sweep away dams, embankments and the land as well.

The unirrigated portion consists of the Thal and southern Marwat. Ploughing and sowing form one operation and cultivation is confined to

the *rabi* crops only. Wheat and gram are practically the only crops grown. Outturns are light. Wells are few.

The area of the district is 1,675 square miles. At the settlement of 1903-07, forty-eight per cent of the total area was under the plough and nearly one-fourth of this was irrigated. The rest depended upon a scanty rainfall. In 1881, the population was 182,000; in 1891, 204,000; in 1901, 226,000; in 1911, 250,000; and in 1921, 246,000.

The district is inhabited by Wazirs, Bannuchis and Marwats. The Bannuchis and Wazirs hold thirty per cent and fifty per cent respectively of the cultivated area in the Bannu tahsil. The Marwats hold four-fifths of the cultivated area in the Marwat tahsil. Saiyids are scattered all over the district and hold about five per cent. The lands of the Bannuchis are the richest. Bannu is, like all Pathan districts, a district of small peasant proprietors.

The first to enter the district were the Bannuchis. They occupied the best lands and by their patient and plodding industry have worked out and maintained the elaborate system of irrigation which is the chief basis of the prosperity of the district. They are a home-loving people and stagnate on their petty holdings, the average size of which is some two acres. They are good at agriculture, poor in physique and listless and extravagant in character.

The Marwats, who form a branch of the Lodi tribe, ousted their kinsmen the Niazi Pathans and occupied their lands. They are a simple, frugal and hardy race, inferior to the Khattaks in enterprise, to the Wazirs in intelligence and to the Bannuchis in industry. Unlike the Bannuchis, they have kept their blood and their customs pure. Traces of *khula vesh* still exist among them. They enlist freely in the Army as well as in the Border militias.

The Wazirs came in the second quarter of the nineteenth century. These hungry, hardy and greedy mountaineers were pressed out of their highlands by their hereditary foes, the Mahsuds, and in turn displaced the soft Bannuchis.

The British occupation has stereotyped conditions. The Wazirs of the hills cannot now descend and oust the people from their lands. Impelled by hunger, they beat ceaselessly against the rampart of law and order, a fact which is at the root of many of the troubles on the frontier.

(*c*) *Dera Ismail Khan.*—Dera Ismail Khan is the most southerly of the five districts. Its area is 3,458 square miles. Its greatest length is 90 and its average breadth is 40 miles. The district is divided into three tahsils: (1) the headquarters tahsil lying north and south, along the Indus, (2) Kulachi, parallel to the headquarters tahsil and including the submontane tract in the south-west and (3) Tank, which occupies the north-west corner.

The district falls into two main natural divisions: (1) the Kachhi or Indus valley proper, lying below the present high bank of the river, and (2) the Daman (literally, the skirt of the hills), which occupied the whole tract

between the Indus valley and the hills. The soil of the Daman is made up of the alluvial deposits brought down by hill torrents ; the Kachhi is composed of silt and sand. The tract lying at the foot of the Sheik Badin Hills differs from the rest of the Daman in having a sandy soil.

Throughout the Kachhi, the water is close to the surface. In the Daman, with the exception of a few small streams, which disappear soon after they leave the hills, there is no permanent supply of water. Cultivation, the existence of men and cattle, depend upon the storage of flood water.

Irrigation in the riverain tract is carried on largely by means of wells and during the summer by means of inundation canals known as the Tuckerwah, Puran and Kasschuhra. The soil of the riverain tract is divided into four classes : (1) *retli*, soil with a large admixture of sand, (2) *drammar*, soil with a thin surface layer of sand, (3) *mattiwali*, soil enriched by silt and (4) *gas*, light loam.

Constant uncertainty as to the river's action leads to haphazard methods of cultivation. After harvesting their wheat, the people move off to villages situated on higher land, to escape the floods.

The Daman tract is roughly 90 miles long and 30 miles wide. The soil is poor. Good crops of gram are obtained in the *rabi*, if the rain has been favourable. The northern part of the Daman is a *barani* tract ; along the western border of the Daman, there are small patches of cultivation, dependent upon perennial hill streams, known as *zams*. The more important of these are : (1) the Gomal and Tank, (2) the Zarkanni, (3) the Draban, and (4) the Chaudhwan *zams*. The bulk of cultivation in the Daman is dependent upon flood water from hill torrents, the principal ones being the Suheli, Takwara, Luni, Sawan, Toa, Waleyri, Gajistan and Ramak.

Conditions of life in the Daman are extremely hard. The hill torrents very often either bring down no water or at times too much, causing floods. There is a chronic scarcity of water. Men and cattle from some villages move down to the Indus in the hot weather. Those who do not, have to content themselves with one drink a day and the cattle with one every other day. The Daman would be a desert, were it not for the aborious building of dams and the embanking of fields. The staples of the Daman are *bajra* and wheat. The rainfall of the district is low, the annual average for the two tahsils of Dera Ismail Khan and Kulachi bring less than nine inches. For the Daman, the rainfall on the hills is of greater importance, as the hill torrents supply the deficiency.

At the settlement of 1906, the total area of the district was classified as follows :—

(1) Unculturable, twenty-six per cent.

(2) Government waste, two per cent.

(3) Old waste which has not borne a crop for four years, forty-three per cent.

(4) New waste which has not borne a crop, five per cent.

(5) Cultivated, twenty-four per cent.

Dera Ismail Khan is the poorest and the most insecure district on the Frontier. Remissions of revenue are frequently necessary. The system of fluctuating assessment by crop rates prevails.

The Pathans are in a minority. Important tribes are the Jats and Baloches. The population of the district was 203,000 in 1881. At the census of 1921, it was 260,000.

3. DEPARTMENTAL ACTIVITIES.

The administration of the province is conducted by a Chief Commissioner and Agent to the Governor General in Council, with the help of a Revenue Commissioner, two Judicial Commisioners, five Deputy Commissioners and five Political Agents for the trans-border area. There is also the usual Secretariat at the headquarters. The province does not possess a Legislative Council. Local self-government, in the strict meaning of the term, does not exist. The members of district boards and municipalities are all nominated. The chairmen of district boards are officials. The province raised Rs. 77·22 and 78·5 lakhs in revenue and spent Rs. 270·89 and 285·25 lakhs in 1924-25 and 1925-26, respectively. Three heads of expenditure, Political, Police and Civil Works, which possess an all-India aspect absorbed Rs. 96·1 lakhs, 51·5 lakhs, and 52·9 lakhs, respectively. The land revenue administration is on the same lines as in the Punjab. Tenures are simple.

Owing to the small size of the province, and in order to avoid stagnation, this province and the Punjab have a common superior cadre in some departments, *e.g.*, the Police and Income Tax.

Some efforts to start co-operative societies in the province were made in 1904 but these were a complete failure and it is only since 1924-25 that the movement has been heard of again and a few societies, less in number than the fingers of one's hands, have been started in the districts of Hazara and Peshawar. The budget allotment for sanitary measures for the whole province was Rs. 82,000 in 1925-26. Rural areas are given some help out of this grant if they make a demand. Hospitals exist at the headquarter station of each district. Smaller towns have dispensaries. The agriculturist has to go to these towns to get medical help. Plague, cholera and fevers are responsible for much loss of life and ill-health. Typhus and relapsing fever are being steadily introduced into the province by caravans from the west. The staff of the Veterinary Department consists of two inspectors and twenty-one veterinary assistants, with a superintendent who is also in charge of the Northern Punjab Circle. Diseases of livestock are also to some extent brought in by the herds of nomad graziers and traders from Afghanistan. The demand for education is keen and is spreading even across the border.

The first edifice which attracts the eye of the weary traveller, as he emerges from the oppressive rocky desolation of the Khyber is one dedicated to learning. The Islamia College is a symbol at the gateway of British India, proclaiming her message, far and wide, to men across the border. In 1901, the year in which the province was formed, there were 28 secondary and 154 primary schools for boys and 8 primary schools for girls. The number of scholars in all kinds of institutions was 12,938; of these 5,082 were in secondary and 7,365 in primary schools for boys. The eight girls' schools had 491 pupils. The total expenditure on all kinds of educational institutions was Rs. 1,52,972.

The development that has occurred since then, during the first quarter of the century, may be judged from the following figures. In 1926-27 there were 3 arts colleges which are private institutions but receive State aid; 25 high schools, 70 vernacular middle schools, 547 primary schools for boys, 70 primary schools for girls and 286 private schools. The total number of institutions of all kinds was 1,033, the number of scholars 69,718 and the total expenditure under education amounted to Rs. 20·76 lakhs. Much still remains to be done and the cry is for more. The percentage of male scholars to the male population of school-going age in the year 1926-27 was 33·7 and of girls only 4·8. There is the usual wastage in the primary stage. For example, out of 51,967 scholars in the primary schools, the number in class I was disproportionately large. No less than 30,561 were in that class, 9,001 in class II; 6,690 in class III and 5,715 in class IV.

The province has two agricultural farms—one at Tarnab near Peshawar, comprising 180 acres and the other at Haripur in the Hazara district, extending over some 20 acres. The sanctioned staff of the department consists of the Agricultural Officer and six agricultural assistants. For research, the province is dependent on the visits of experts from Pusa. Two improved varieties of wheat, Pusa No. 4 and Federation, have been introduced. It is the aim of the department to help in the development of the trade in fruit by improving first the varieties at the farm at Tarnab and afterwards introducing them among the fruit growers of the province. Widespread cultivation of *berseem* or Egyptian clover promises to be a success.

There are in the province, chiefly in Hazara, 381 square miles of reserved and protected forests, exclusive of large areas of village forest and grazing ground. The Deputy Conservator of Forests exercises a control which may be close or merely nominal. Reckless grazing is producing much harm in the principal forest area, that is, the district of Hazara. When no grass is available on the ground, the goat-herd does not hesitate to use his staff which has a curved blade at one end to lop off the branches of valuable trees.

Recently, measures have been initiated to check the future denudation of the existing forests in the catchment areas of the Indus and its western tributaries, and to build up fuel reserves in and around the Peshawar valley to meet the ever growing pressure of a dense population or inadequate fuel resources. The preservation of forest cover in the upper basin of the Indus and its tributaries is not only of vital economic concern

to the people, but has intimate reactions on the Peshawar canals, and on the vast Indus irrigation projects of the Punjab and Bombay.

The Irrigation Department is controlled by a Superintending Engineer, lent by the Punjab Government, under whom there are three executive engineers and seven subdivisional officers besides the subordinate staff consisting of overseers and sub-overseers. The department manages the Lower Swat, the Upper Swat and the Kabul River canals. Other canals, constructed by the people themselves or by Government, are managed by the Deputy Commissioners. If the services of an irrigation engineering staff were available for those district canals, managed by Deputy Commissioners, they would be improved out of all recognition. The possibilities of Kohat and Hazara in irrigation have not been investigated. Dera Ismail Khan requires check dams and delay reservoirs for stopping the destructive action of hill torrents. The needs of Peshawar are, realigning, proper outletting of canals, prevention of waste of water and proper attention to drainage. Improvement and extension of irrigation in Bannu, including a thorough investigation of the upper reaches of the Kurram and the Tochi, with a view to reducing the violence of floods and ensuring a steady flow in the cold weather by the construction of dams and reservoirs are considered necessary by the Superintending Engineer.

4. THE TRIBAL TERRITORY AND ITS PROBLEM.

The regions between the settled districts and the Afghan frontier are generally known as the Tribal Territory. In the extreme north lies Chitral. South of Chitral are Dir and Bajaur and the fertile valleys of the Panjkora and Swat rivers. Then towards the south-west come the Mohmand Hills, a rough and rocky tract with little cultivation. Further south lies the Khyber Pass, the historic route to India. South of the Khyber Pass is Tirah, the maze of mountains and valleys held by the Afridi and Orakzai tribes. Next comes the Kurram valley, stretching in a south-easternly direction up to the Miranzai valley in the Kohat district. South of the Kurram lies Waziristan, a rugged and inhospitable medley of ridges and ravines, straggling and confused in hopeless disarray, especially towards the west. Waziristan is divided into two parts—North Waziristan and South Waziristan. There are two fertile tracts in North Waziristan, *viz.*, the valleys of Daur and Kaithu, and two in South Waziristan, the Wana plain and the valley below Kaniguram.

The tribal territory is inhabited by a number of tribes, the principal ones being the Wazir, the Mahsud, the Zaimusht, the Orakzai, the Afridi, the Mohmand, the Ranizai of Swat and the Yousufzai of Buner. They are divided into many sections and sub-sections. Faction creates another line of division among the tribes, some being in the *Tor Gundi* (the Black Party) and some in the *Spin Gundi* (the White Party), for purposes of protection and aggression.

Islam is the religion of the tribes. Passions are hot and feuds are endemic. There is a saying current among two tribes in the Kurram to-

the effect that "if you boil their flesh and bones and our flesh and bones together, the water will not mix." Their rocks are hard, the people not less so. The ultimate sanction for such law and order as exists is the rifle in the hands of the individual tribesman. The rifle is now the modern weapon of precision and not the old *jazail*, the matchlock gun. The tribal organisation, in most cases, is on extreme democratic lines.

Their past history reveals some interesting facts. They have never owed allegiance to any master, established either east or west of the Indus. Their independence they have valued more than their lives. At no time have they shown any desire to relinquish it. Their desire to maintain it is equally great at the present day.

Holding the territory which lies athwart some of the great trade routes between Central Asia and India, they have exacted contributions from commerce. At the present day, they receive tribal allowances which have their origin in historical antecedents. Some portion of these allowances is for the rendering of service, *e.g.*, escort of caravans; some for the privileges surrendered, *e.g.*, the right to levy tolls; and some for concessions granted, *e.g.*, construction of roads.

The estimated population amounts to nearly 2·8 millions. The population of the five settled districts is 2·25 millions. In point of economic resources, the districts with a smaller population are in a far stronger position than the tribal tracts. There is little fertile land in the latter. Much of the area is taken up by mountains, which produce little. The meagre agriculture and pastoral pursuits do not provide enough. Of trade there is little; of exploitation of natural resources, there is none; the population is greater than the land can bear.

The tribesmen are thus forced to cast longing eyes at the plenty that prevails in the plains. Their intercourse may be peaceful or otherwise. Large numbers come down in winter in search of work. In summer they retire to their hills. Sometimes they supplement their scanty resources by raids. On occasions, which are now happily becoming few and far between, the frontier may be ablaze. Such conflagrations may be general or partial.

Experience has brought home the fact that the basic problem of the tribal tracts is the primeval one, hunger. The mountains breed many but they feed few. For the solution of the mountaineer's problem the remedies required are primarily economic. Like mountaineers all the world over, the tribes are forced to supplement their scanty resources either by peaceful means or by armed robbery. A parallel in English history may be found in the position of the Highlanders of Scotland until, after the rebellion of 1745, the English Government of the day sought a remedy for its troubles by opening for the warlike Highlanders a military career in the Highland regiments and by constructing Wade's road for effective military operations. It may be mentioned in passing that the most effective weapon at present employed for bending the political will of the tribes is the blockade. It manifests itself in three

forms, *viz.*, (*i*) seizure of tribesmen in British territory, (*ii*) stoppage of allowances, and (*iii*) stoppage of intercourse. This pressure is exercised not in tribal but from British territory.

For a permanent solution, however, the remedies, as stated above, must be of an economic character. These are the opening up of the country by means of communications and the systematic development of its economic resources.

The political control over the tribes is exercised through five political agencies maintained in the tribal tracts. From north to south the agencies are :

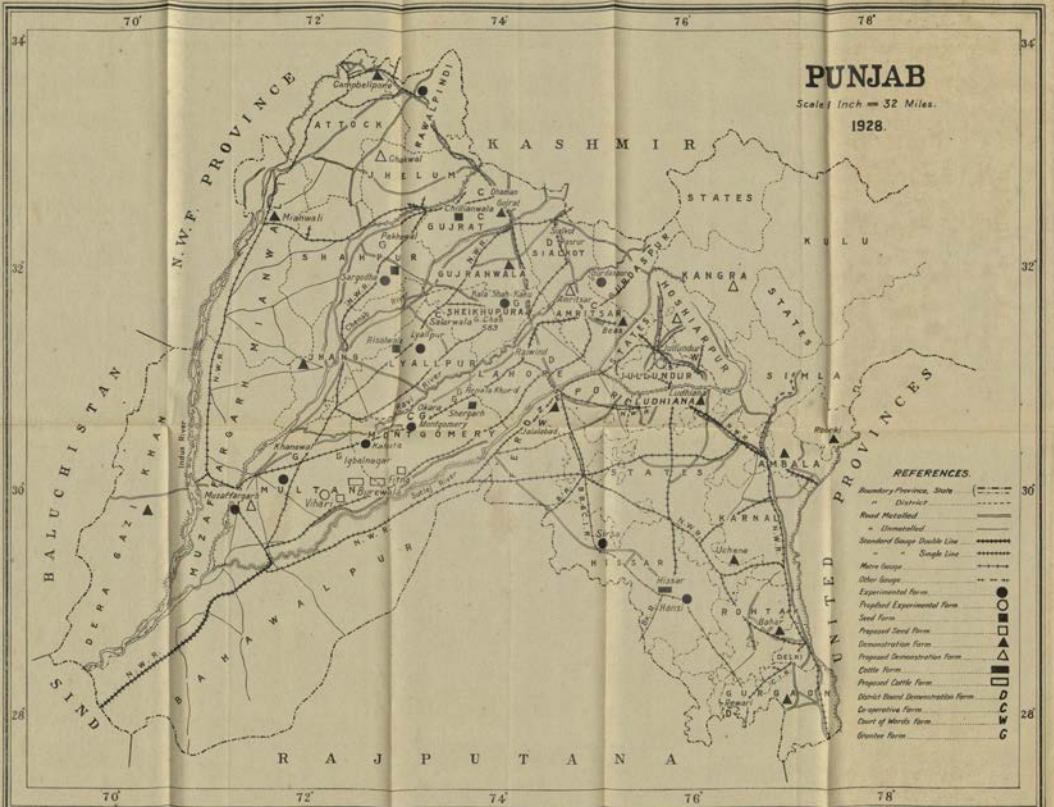
(*i*) The Malakand Agency which embraces Chitral, Dir and Swat ;

(*ii*) The Khyber Agency, for the areas adjoining the Khyber Pass ;

(*iii*) The Kurram Agency, where conditions are more settled ;

(*iv*) and (*v*) Waziristan, which is split up into two charges, North Waziristan and South Waziristan, the basis of the Agencies being the Tochi valley and the Wana plain respectively. For co-ordination there is a Resident in Waziristan.

The deputy commissioners of the five settled districts are also in charge of political relations with such tribes or sections of tribes, as occupy territory adjacent to their charges. The political agents and the deputy commissioners are under one common authority, the Chief Commissioner, who, in his capacity as agent to the Governor General in Council, harmonises the control of the tracts with the administration of the districts.



Govt. Photozinco. Office, Poona-1928. Offset.

THE PUNJAB.

1. GENERAL FEATURES.

The Punjab, with a total area of 65 million acres, is a country just twice the size of England and greater by 9 million acres than the whole of Britain. About 3 million acres are occupied by the territories of certain Indian States* while 62,260,000 acres are under direct British administration. The northern portions of the province are mountainous and provide little culturable land, and even in the great plains there is still much land which, for want of water or other causes, is not under cultivation. At the present time the total area cultivated—an area growing rapidly as irrigation extends—is about 30 million acres. It is estimated that a further 15 million acres are culturable. Thus in time there will be available for the Punjab peasant a possession equal in extent to the whole cultivated surface of the British Isles.

The rainfall in the mountains is often torrential, in the sub-montane tracts it is sufficient, being usually from 30 to 40 inches, but throughout the plains it is scanty and uncertain, increasing gradually, as one traverses the province, from less than 5 inches in the south-west to 30 inches in the north-east; a fall of 10-12 inches may be expected at Lyallpur, 18-20 inches at Lahore and at Hissar, in the south-east, 11-13 inches. Readers of gazetteers not sixty years old will find the greater part of the Punjab plains described as being sandy deserts. But in the interval irrigation engineers have been at work and the deserts have largely been converted into fertile territory occupied by extensive cotton fields in the autumn, and by still more extensive wheat fields in the spring. Water is still, however, the paramount consideration to the Punjab cultivator. Too little of it, or occasionally too much, is at the bottom of most of his perplexities; his grievances centre round the short-comings, real or supposed, of the men who control the canals, just as the grievances of the British farmer usually originate from the failings of the clerk of the weather; but on the whole the unbiased observer must agree that, at least in the canal colonies, the Punjabi cultivator is the better served of the two; he can plan his tillage operations, sow his seed, and reap his harvest with a degree of certainty that many a British farmer would envy. Nor is the temperature, if hard on man and beast, unkind to the crops. There is rarely, as there was in the winter of 1926-27, a killing frost. Cotton gives rise to anxiety in cold winters, but only in the case of certain varieties, sugarcane can be grown even in the northern portion of the Province, and is seldom a failure, and

* Until 1920–21 the area of Indian States included in the province was 24,500,000 acres. Most of these States have been brought into direct political relationship with the Government of India.

tobacco is more certain of a safe season than the early potato crop of Britain. In the colder months the temperature of the plains may range from 35 to 45 degrees, and the growth of cereals is slow; but this gives them time to root and tiller before the forcing weather of the springs sets in, and they are seldom far enough advanced to be laid badly (as British crops are in July) by the occasional rain-storms of early spring. In the summer months, when the mean maximum temperature may rise to 110 degrees or even more in the shade, growth is extraordinarily rapid, and if weeds do grow apace on badly tilled land, the careful husbandman has his opportunities. He may then grow not only the main staples, but minor crops in a variety, and catch crops to an extent, impossible in a temperate climate.

The soils of the plains consist for the most part of a very deep alluvium, of light to medium texture; when dry they often appear to consist wholly of sand, but mixed with the sand of the surface soil there is always a proportion, often a very large proportion, of fine silt, naturally rich in plant-food, and under irrigation capable, even without manure, of producing for a long period crops that could not be equalled on unmanured land in Britain.

For successful cultivation in the plains water is the one thing needful, and this, as will be shown later, has been and is being supplied to new tracts at a rate which it is difficult for those who have no experience of large irrigation works to realise. The Punjab Administration Report for 1924-25 contains a graph showing that the area watered by Punjab canals rose from about 2 million acres in 1887-88 to over 11 million acres in 1922-23, and it is pointed out that the area irrigated by canals is now greater than all the ploughed land of England and Wales. It may be added that in five years' time it is likely to equal the whole arable area of Britain. It is, indeed, difficult to convey by mere figures the effect which these canals have produced on Punjab agriculture; the very term "canal" belittles them to those who are familiar only with British canals. The canals of the Punjab may perhaps be described as great "inverted" rivers. One of the largest, the Upper Chenab, may, without exaggeration, be described as an artificial Thames; for its upper reaches carry as much water as passes under London Bridge when the Thames is flooded, and its water passing into its "tributary" Lower Bari Doab Canal, fertilises the fields of cultivators as far distant from the head works as is the source of the Thames from its mouth.

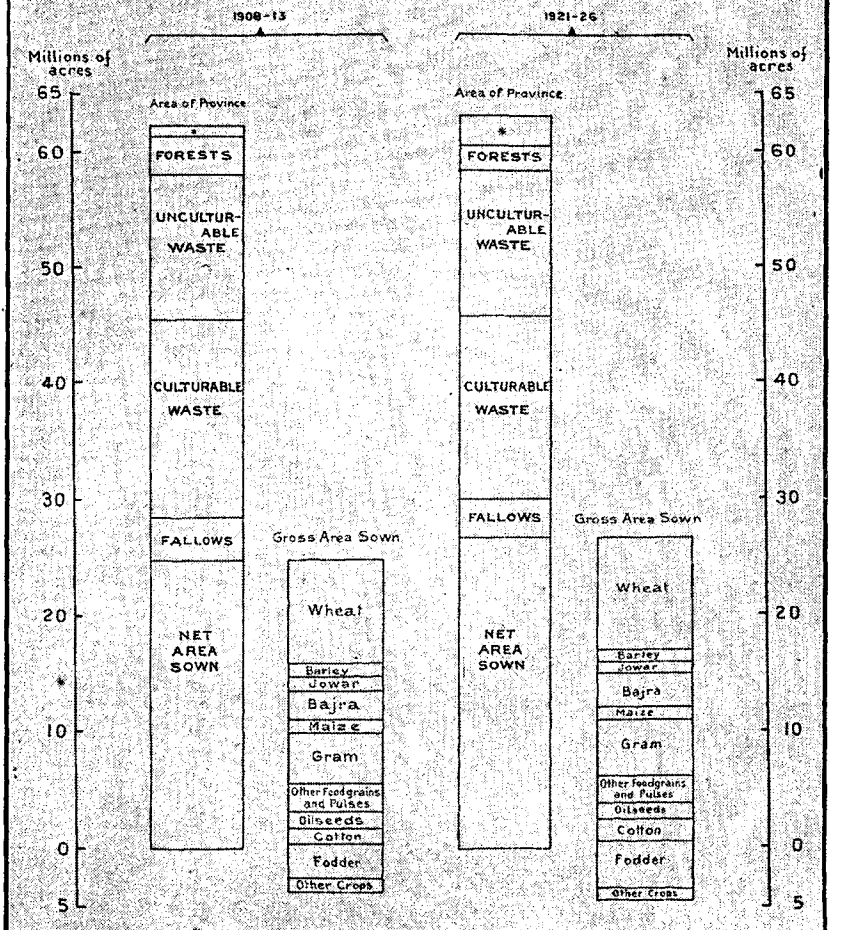
The relative importance of the chief crops of the Punjab is shown by the diagram at the end of this introduction. It will be noted that wheat, gram *bajra* and fodder are the crops which occupy most land. The crops sown in 1925-26 and the current fallows account for nearly 34 million acres of cultivated land, and as the actual area under cultivation is about 30 million acres, it will be seen that some $3\frac{3}{4}$ million acres of crops resulted from double-cropping favourably situated fields. The

PUNJAB

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 Year Averages)

Note: The difference between the Gross Area Sown & the Net Area Sown represents the area sown more than once.



* The areas marked with an asterisk represent the difference between total area of the province according to the Professional Survey and the total area according to the Village Reports, the latter being the source from which this diagram was constructed.

To face page 292

normal rate of crop failure is 21 per cent. It goes as high as 65 per cent. in dry areas in poor years.

For the harvest of 1925-26 the Department of Agriculture has prepared some estimates which illustrate the scale of Punjab agriculture. The aggregate value of the chief Punjab field crops in that year was estimated at about Rs.100 crores (approximately £75 millions). Over one-third of this total was attributable to the wheat crop, of which 9.5 million acres had been sown. The resulting crop was estimated at 2.9 million tons of wheat. The magnitude of the Punjab wheat crop is emphasised if we recall the fact that it equals about half the annual import of wheat into Britain, and that (if we exclude the grasses and clovers grown by him) it covers nearly as much land as the British farmer has at his disposal for the growing of all his other crops. Next in importance to wheat in point of value is the cotton crop, which, in 1925-26, was worth nearly Rs.15 crores.* The next crop in order of value was gram (Rs. 8.6 crores). Of lower relative value, but of great intrinsic importance, were raw sugar 6.0, rice 4.6, maize and *bajra* 3.8 each, oil-seeds 3.2, and barley 2.1 crores.

A periodical census of livestock is taken. In the last four of these cattle have shown no tendency to increase; the figures were: 1908, 14.2 millions; 1914, 15.5 millions; 1920, 14.3 millions and 1923, 14.9 millions. In the last census year there were 4.1 million bullocks (including bulls), 2.7 million cows, 3.0 million buffaloes, and 5.1 million young stock, including young buffaloes. These figures are open to question, and the Agricultural Department estimates the approximate numbers to have been 4.5, 3.0, 3.4 and 4.0 million respectively. There is no doubt that the actual number of cattle, both for draught and dairy purposes, is sufficient, but the quality, especially the quality of milking cows, leaves much to be desired, and in urban centres the supplies of milk and *ghi* available are limited, and the prices high.

The numbers of sheep and goats in 1923 were 4.1 and 4.3 million respectively, and there were 390,000 horses, 650,000 donkeys and mules, and 260,000 camels. Sheep are important in the arid tracts of the province, while goats are widely distributed. The breeding of army remounts and transport mules is a considerable industry in a few districts. Camels are found mainly in the dry, sandy areas.

2. NATURAL DIVISIONS.

From the point of view of agriculture, five fairly well-marked divisions may be distinguished in the Punjab. A brief reference to the characteristics of each will be desirable.

Central Division.—This division, which stretches from Gujrat in the north to Muzaffargarh, Multan and Ferozepore in the

* In 1924–5, a very favourable year for cotton, it was worth nearly Rs. 20 crores.

south, is much the most important agricultural part of Punjab. It is bounded in part by the Jhelum on the west, and is traversed by the rivers Chenab, Ravi, Beas and Sutlej. It consists of level plains with narrow strips of low-lying land bordering the rivers. Until about thirty years ago, the western (Canal Colony) region of these extensive level plains was almost valueless owing to the rainfall being insufficient to mature crops; but almost the whole area has now been commanded by canals most of which are perennial. The cultivators in this tract consist in part of those already settled along the river valleys before canals were constructed, and in part of colonists introduced from congested districts of the Punjab. The latter have been settled on " squares " or " rectangles " of land of from 25 to 27½ acres, and new, carefully-planned, villages have been built. The compact, well-arranged fields enable cultivators to work their holdings economically and the general level of cultivation in the canal colonies is high. The leading crops are wheat, gram, Punjab-American cotton, rape, and mustard.

Western Division.—To the north-west and west of the central irrigated area, and composed of the districts of Jhelum, Rawalpindi and Attock, with parts of the districts of Shahpur, Mianwali and Dera Ghazi Khan, is a dry area not open to irrigation from canals and irrigated only to a small extent from wells. Agriculture is, therefore, dependent on rainfall, which in the north of this area is usually sufficient to mature a crop, but in the west and south is uncertain and deficient. Here and there in river valleys good cultivation is found, as in the Chhach circle of Attock, where valuable crops of sugarcane and tobacco are grown under well irrigation; but for the most part the riverain tracts produce indifferent wheat and gram crops in winter, and small quantities of fodder in summer. The people are almost entirely Muslim, of fine physique. Cattle and horse-breeding help to supplement the meagre yield of the crops. This division forms a notable recruiting ground for the army; thus income from the land is assisted by the pay and pensions of soldiers.

Mountainous Region.—Along the northern boundary lies the western portion of the great Himalayan chain. The north of Gurdaspur district and the whole of Simla are embraced in its spurs, while, in between, the district of Kangra lies right athwart the range, two of its cantons being in trans-Himalayan country. The rainfall is abundant, but the soil is rocky and the surface often precipitous, so that much labour is involved in terracing and preparing land for cultivation. Rice is cultivated with the aid of irrigation from watercourses led out of mountain streams; on unirrigated land wheat, barley, maize, pulses, buckwheat and amaranth are grown as food crops, and sheep-breeding supplements the earnings of the people. As in the case of the Western Division, many young men join the army. The pressure of population on the land is

great, and the problem of improving the output of these over-peopled mountain soils is as important as it is difficult.

Submontane and Eastern Division.—Between the Central Division and the mountainous region referred to above, there lies a submontane tract with a rainfall of from 35-40 inches, and a wide stretch of flat country with a rainfall of from 15 to 20 inches. The administrative districts included in this division are Sialkot, Gurdaspur, Hoshiarpur, Jullundur and Ambala, with parts of Ludhiana, Karnal, Rohtak and Hissar. With the exception of Jullundur and Hoshiarpur, all these districts receive irrigation from the great canal system, but the Western Jumna can only protect a part of the three south-eastern districts of Karnal, Rohtak and Hissar, leaving the great portion of the land dependent upon a very capricious rainfall. In the whole tract, well-irrigation is an important feature. In areas where the water table is within 20 to 40 feet of the surface and where the texture of the soil is light and suitable for intensive cropping, the cultivation is of very high quality.

In the submontane tracts wheat, and even sugarcane, can be grown without irrigation. The country is naturally rich, but the climate during the monsoon period is unhealthy. Much fertile soil has been lost in recent times in parts of the Hoshiarpur and Ambala districts because of erosion following the destruction of hillside forests. A special Act (Act No. II of 1900, as amended by Act No. IV of 1905, Act No. VII of 1926 and Act No. VIII of 1926) has been passed to prevent further damage, and efforts are being made to enlist the sympathy and aid of the people in restoring trees on the devastated slopes.

South-Eastern Division.—This dry region includes those parts of the districts of Hissar, Karnal and Rohtak not watered by the Western Jumna Canal, and Gurgaon. Although the rainfall is usually somewhat greater than in the Western Division, this region suffers much from drought. In some parts well irrigation is possible, but in others the water table is so deep that raising water is too expensive. Some assistance to the natural rainfall has been given by constructing dams, but much remains to be done before the requirements of crops are met. Crop-growing being so uncertain, special attention has been given to cattle-breeding, and this tract is the home of the celebrated Hariana breed.

3. PROVINCIAL INCOME AND EXPENDITURE.

In order that the activities of the Punjab in developing its resources may be traced in proper perspective, it will be necessary to glance at the financial position. In certain other provinces there was much evidence to the effect that lack of money was the root of all evil. This was not the case in the Punjab, although in picturesque terms it was pointed out to the Commission that there were times within the past five years when the

GOVERNMENT OF THE PUNJAB.

Revenue and Expenditure Charged to Revenue.

(Figures are in lakhs of Rupees.)

Revenue Head.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	Expenditure Head.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.
Principal Heads of Revenue—						*Direct demands on the Revenue—*					
Land Revenue	221	298½	299	294	306	Land Revenue	49	45½	41½	42	44
Excise	116	103	104	119	123	Forests	44	49½	29½	27	26½
Stamps	82	89	96	116½	114½	Other heads	8	7½	7	8	21½
Forests	50	34	44	37	41	Capital outlay on Forests charged to Revenue.	—	—	—	—	2
Other Principal Heads... ...	6	12½	11	11	13						
Irrigation : Net Receipts... ...	333	364	392	430	457	Irrigation—Revenue Account ...	92½	89½	102½	109	115½
Debt: Interest	4	6½	5	6	12	Irrigation—Capital Account charged to Revenue.	0½	—	—	—	81
Civil Administration	31½	37	41½	41	41						
Civil Works	4	4	5	5	6	Debt Services—Interest on Ordinary Debt.	—4	2½	6½	—1	—6
Miscellaneous	17	25	24	25	23						
Miscellaneous adjustments between Central and Provincial Governments.	—	—	—	1	0½	Debt Services—Reduction or avoidance of Debt.	—	—	—	2	2
						Civil Administration—					
Extraordinary Receipts (Sale of Waste Lands, Government Estates, Town Sites, etc.)	33	30	69½	68	129	General Administration	97	101	100½	99	104
						Administration of Justice	44½	45½	53	54	52½
						Jails and Convict Settlements ...	36	38½	29½	30½	32½
						Police	111½	122½	110	112	107½
						Education	88½	99½	103½	109	142
						Medical	32	30½	31	30½	35½
						Public Health	11	11	11	15	16
						Agriculture	32	30½	28	28½	38
						Industries	6	8½	8½	7	7½
						Other Departments	1	2	2½	3	1
						Civil Works	124½	105	84½	70	109
						Miscellaneous	107	96½	55	49	62½
						Provincial Contribution to Central Government.	175	175	175	175	114
						Miscellaneous adjustments between Central and Provincial Governments.	13	0½	—	1	—
Total Revenue	897½	1003½	1091	1153½	1266	Total Expenditure charged to Revenue	1069	1061	979·	972½	1108½

Capital Receipts and Expenditure.

Receipt Heads.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	Expenditure Heads.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.
Revenue Surplus	—	—	112	183	157½	Revenue Deficit	171½	57½	—	—	—
Loans and Advances	13½	42½	21	18	15	Construction of Irrigation Works ...	19	91	146½	83	82½
Permanent Debt incurred... ...	—	—	192	—	73½	Civil Works	—	2	1½	20	19
Loans from Central Government (for Revenue).	100½	60	—	—	—	Loan from Central Government (repaid).	—	—	100½	—	1
Loans from Central Government (for Irrigation).	—	72	—	—	—	Loans and Advances	63½	23	11	30	18
Famine Insurance Fund	—	4	4	3	3	Payment to Central Government of Balance of Provincial Loan Account.	53	—	—	—	—
Reserve and Sinking Fund ...	—	—	—	2	2	Other Capital Expenditure	—	1	1½	4	3½
Total Capital Receipts ...	114	178½	329	206	251	Total Capital Expenditure ...	307	174½	261	137	124
Opening Balance	193	—	4	72	141	Closing Balance...	—	4	72	141	268

wastepaper baskets of departments were being ransacked in the hope of converting the contents, if not into rupees, at least into annas and pies! Although great capital commitments have been, and are being, incurred on irrigation and other public works, a substantial proportion of the investments rapidly become remunerative; and difficulties, when they have arisen, have more often been of the kind experienced in a rapidly expanding business, than of the kind which embarrass the chancellors of debt-encumbered nations. In 1921-22 the Government had on its loan account an overdraft of about a crore from the Government of India. This has been paid off; and the capital since required, with the exception of 1½ crores raised by loan at 6½ per cent, has been provided from ordinary revenue or extraordinary receipts. But it is not now intended—for this is not the time or place—to discuss the financial situation and financial outlook of the province. All that is here required is to state what the recent income and expenditure have been and to show the main headings under which receipts accumulated and disbursements have been made.

4. REVENUE ADMINISTRATION AND LAND RECORDS.

Benefiting by the experience of the older provinces the Government of the Punjab from the beginning devoted careful attention to local facts and customs in devising a system of administration of land revenue and tenure.

For the purpose of revenue management the whole province is divided into five divisions, each under a commissioner, not identical with, but roughly corresponding to, the natural divisions above described. The divisions are further divided into twenty-nine districts, each in charge of a deputy commissioner. The districts are sub-divided into three or four tahsils each in charge of a tahsildar and an assistant or naib-tahsildar.

The unit of revenue administration is an estate, usually identical with a village, of which there may be on an average from 200 to 400 in each tahsil. In each village there are one or more headmen or *lambardars* who represent the villagers in their dealings in revenue mattters with government officials; the headman is a paid representative, getting five per cent of the revenue collected from the village. Originally the villages were treated as communities jointly responsible for the total amount of revenue due, and legally this obligation remains; but in practice in the canal colonies the revenue is now collected from the individual who is the owner or grantee of land registered as his holding in the village records. Much attention is given to village records, the whole of the land is carefully mapped on a scale of 220 feet to the inch, and a village register of rights of ownership, and tenancy, is maintained by a minor revenue official, the *patwari*, who has charge of the books of one or more villages. The villages are grouped into circles or *zails*, and in each circle

a leading *lambardar* is recognised as *zaildar*, or representative of the people, and as such he receives payment for his services. To supervise the work of *patwaris* a *qanungo* or inspector is appointed. A *qanungo* usually supervises proceedings in some twenty circles. Close inspection is necessary, for much detailed work is required of the village *patwari*. His village note-book summarises the revenue records in statistical form and so constitutes the basis of all agricultural statistics The different revenue records show : the area of each holding; the *kharif* and *rabi* crops grown; the position as regards revenue payable, or paid; the transfers of land, whether of ownership or of occupancy rights; a list of owners and of mortgages or revenue assignments effected by them; statements of the rent paid by tenants-at-will; and a record of the livestock, and of certain kinds of dead stock, in the possession of the cultivators. Special importance is attached to the Record of Rights. Under the Punjab Land Revenue Act, 1887, which is the basis of all revenue administration in the province, a record must be maintained for every estate, showing all the fields into which the estate is divided, the names of the persons who are owners or tenants, and the nature of their interest in the land. This record must be brought up to date and re-written every four years, and, at intervals of twenty or thirty years, when the assessment to land revenue is re-settled, a special revision of the village records is made.

The re-settlement of a district is a lengthy process conducted by a special settlement officer, under the supervision of the commissioner of the division and the Financial Commissioner of the province. The district is in the first place divided into assessment circles in which the agricultural conditions are similar, and then a careful estimate is made of the net rents, or assets for each circle. These estimates take into account cash rents in the relatively few cases in which cash rents are paid. When rent is paid in kind the produce of land, customary payments to village menials and other consequential charges are ascertained, and the revenue is based on the estimated net income derived from ownership of land. In pre-British times the rulers of the Punjab collected produce rents, varying with the times and with the ruler's conception of his rights and his needs, but always high. Originally the maximum cash demand made by British collectors was limited to 50 per cent of the net assets; but as in practice this figure was never reached, and is now being reduced to 33⅓ per cent, the usual revenue demand is about 25 per cent of the estimated net assets. In addition to the land revenue, villagers have to pay a local rate imposed by district boards on all land assessed to land revenue, which varies from district to district, and is limited by statute to an amount not exceeding twelve and not less than ten pies for every rupee of its annual value.* There are also certain village cesses.

* The Punjab District Boards Act, 1883, as modified up to 8th May, 1925.

The total amount of land revenue collected in the year ending 30th September, 1924, was 443 lakhs of rupees, of which 243 lakhs was permanent and 200 lakhs fluctuating revenue. The collection of fluctuating revenue is a feature in the Punjab administration. It originated because of the great uncertainty of the harvests in the dry tracts. With the object of reducing suspensions and remissions of revenue, the plan of charging revenue on the land from which crops were actually harvested was introduced. It was subsequenly found that this method of collection was also specially suited to the conditions in canal colonies, where the charges made for canal water had always been based on the actual crop grown and the area under that crop. Remission of this fluctuating revenue is never necessary, though suspension is sometimes called for in the event of unforeseen calamities. In a province where the rainfall is so small two main factors govern the actual amount of land revenue payable. If no means of irrigation exist, soil and rainfall, by determining the net returns which the cultivator secures, determine also the general level at which revenue is levied. If from any source water can be secured which will ensure the ripening of a *kharif*, or a *rabi* crop, or of both, then, since net returns are increased, a higher rate of revenue is collected. Should the water come from a government canal, the cultivator pays, in addition to land revenue, a water rate varying in amount with the kind of crop grown, but in every case the rate charged for canal water is very much less than the cost to the cultivator of raising water from wells. Thus when canal water is brought into a district the wells which may exist there usually fall into disuse.

Just as the Land Revenue Act, with the rules and orders framed under it, regulate the relations between the landowner and the Government, the Punjab Tenancy Act regulates the relations between landlord and tenant. There are two chief kinds of tenants. The hereditary or occupancy tenant holding under old custom, usually paying a privileged rent, and not liable to disturbance so long as he carries out the conditions of his tenancy, and the tenant-at-will. The Act defines the circumstances under which occupancy rights accrue and the nature of these rights, and it protects the tenant-at-will so far as possible from hardship.

A third Act which has an important bearing on the position of the zamindar is the Punjab Land Alienation Act, 1900. Before the passing of the Act much land was being expropriated by moneylenders to whom the owners were indebted. Under the provisions of this Act the main agricultural tribes in each District are listed in groups. Within these groups the Act imposes no restrictions on alienation, members of the listed tribes may sell freely to persons within their own group, but not to others; for the Act allows of the sale of land to non-agriculturists only under special circumstances which must be

approved by the deputy commissioner. The Act has aroused keen controversy; but the criticism so far has come from non-agriculturists, and it is admitted that it has checked the evil which it was designed to cope with. It was at first feared that by affecting the value of land, the Act might injure the agriculturists' credit, but the records of land sales shows that this fear was groundless. There has been a very rapid rise in land values in the Punjab, and such is the land hunger that many sales are now effected at wholly uneconomic prices. For the four years preceding the Act of 1900, the arithmetic mean of the average price at which cultivated land sold in each year was Rs.81 per acre. In the following five-year periods up to 1924-25 the corresponding figures were Rs.77, Rs.105, Rs.158, Rs.231 and Rs.373. The average recorded price of cultivated land rose from Rs.383 per acre in 1923-24 to the record figure of Rs. 438 during 1924-25, and in the Lyallpur district it was as much as Rs.738. The sale price of land for the province as a whole represents 300 years purchase of the land revenue as against 273 in the previous year and 6 at the commencement of the British occupation. For a year or two after the Alienation of Land Act became law prices may have been affected; but the figures for subsequent years make it clear that the movement of land values in the Punjab now calls for a brake rather than a stimulus.

5. THE CULTIVATOR.

It is not possible in this brief introduction to rural conditions in the Punjab to give any adequate account of the many types to be found among the tribes differing in race, and the communities differing in religion, who till the soil of the Punjab. Nor fortunately is such required or necessary; for a Punjab civilian, Mr. M. L. Darling, has recently supplied in his book, *The Punjab Peasant in Prosperity and Debt*,* a description which has already taken its place among the now considerable number of classic monographs that relate to the peoples of India. A sketch of the cultivator, of his social and economic position, and of his special difficulties, has been supplied to the Commission in the memorandum prepared for them by the Punjab Government, and from this source, in itself largely dependent on Mr. Darling's book, a few facts may be given.

The Punjab Census of 1921 showed in British districts a total population of about 21 millions, of whom some 10 per cent lived in towns. The remainder lived in about 34,000 villages, with an average population of just under 500. Of the villagers, 100 would own land extending to about 1,140 acres, of which some 770 acres would be cultivated. The village is constructed from local materials, the flat-roofed houses are usually built of sun-baked mud, while here and there stand the more substantial brick houses of some *bania*, army pensioner, returned emigrant, or

* Oxford University Press, 1925.

retired official. The lay-out, except in the canal colony areas, is haphazard, the water-supply coming usually from a well, tank, or canal. Sanitation, in the sense of an ordered scheme for the disposal of offensive matter, in the words of the Public Health Department, " does not exist." Beyond and surrounding the village site are the scattered fields of the zamindar.* It is difficult to arrive at close estimates of the number of actual cultivators, and of the amount of land occupied by them in different districts, but the estimates usually accepted placed the number of actual landowners, including minors and women, at about four millions, and the number of adult cultivators at between 4½ and 5 millions. Recent economic enquiries based on sample areas suggest that these figures are too high. The samples were extensive, covering over 2,000 villages scattered throughout the province, and the figures obtained throw so much light on the position of the Punjab peasant cultivator that a few of them may be given here.

In the first place, the enquiries bring out the fact that in the Punjab there is no sharp differentiation between the owner, tenant and labouring classes. An owner of a few acres belonging to an agricultural tribe may hire land for cultivation, or he may supplement his income by working for wages; conversely a member of one of the menial tribes, who habitually works for wages, may own a small plot of land. The enquiries were primarily directed to ascertain the conditions of "owners " on the one hand, and of " cultivators ", whether owners or tenants, on the other. The following statement† shows how the land in the sampled areas was distributed between groups of owners and of cultivators.

Group.	Percentage Owned.	Percentage Cultivated.
In holdings of under one acre ...	1·0	1·5
„ „ „ 1 and under 5 acres	11·0	12·1
„ „ „ 5 „ „ 10 „	15·1	20·6
„ „ „ 10 „ „ 15 „	11·5	17·4
„ „ „ 15 „ „ 20 „	8·4	12·3
„ „ „ 20 „ „ 25 „	6·8	9·1
„ „ „ 25 „ „ 50 „	20·4	18·5
„ „ „ 50 and over ...	25·7	7·9

Taking the province as a whole, the " average " cultivated area belonging to an owner would, on the basis of these large samples, work out at about 8 acres, and the average holding under tillage in the occupation of each cultivator, whether owner or tenant, at 7 acres.

* The term zamindar, literally landowner, is in some provinces, as *e.g.*, Bengal, applied only to large landowners; in the Punjab it is used for any landowner, however small.

† 1. "The Size and Distribution of Agricultural Holdings," by H. Calvert C.I.E., I.C.S., Board of Economic Enquiry, Punjab, Lahore, 1925.

2. Cultivators' Holdings in the Punjab, by H. Calvert, C.I.E., I.C.S. Ibid.

Similarly these enquiries point to the conclusion that the total number of owners, including minors and women, is about 3½ million, and that the number of cultivators is just over 4 million.

If the question of the typical Punjab holding is raised, the answer in the first place must point out that in the 29 districts of this large province many types exist. For example, the typical holding in Kangra is entirely different from that in Montgomery and the Montgomery type would not be that of Mianwali; but bearing in mind these distinctions, depending chiefly on rainfall or on canals, it may be said that the Punjab is a province mainly cultivated in small holdings of between 1 and 20 acres. More than 60 per cent of the cultivated area is accounted for in this way, and about half is found in holdings of 1—15 acres.

Omitting from consideration the 625,000 owners and 900,000 cultivators of less than one acre, the following figures show the percentages of the total number of persons owning or cultivating holdings in each group.

Group.	Owners.	Cultivators.
Holdings of 1 and under 5 acres	49·7	42·4
„ „ 5 „ „ 10 „	21·9	26·9
„ „ 10 „ „ 15 „	10·3	13·4
„ „ 15 „ „ 20 „	5·2	6·8
„ „ 20 „ „ 25 „	3·3	3·9
„ „ 25 and over	9·8	5·5

It will be seen that, neglecting the owners and cultivators who have less than one acre of land at their disposal, 81·9 per cent of the remaining owners and 82·7 per cent of the cultivators fall within the 1—15 acre limits.

Outside the canal colonies the holdings of 15 acres and over are usually found where uncertainty of sufficient rainfall makes cultivation precarious, the largest holdings being characteristic of the most arid tracts.

In the canal colonies settlers were originally placed for the most part on squares of about 25 acres; sub-division occurs when sons inherit, but as the colonies are still young the average holding of good land is at the present time substantially larger than in other districts. If we accept these canal colonies, it would broadly be correct to say that the cultivator is always short of land. The increase of the population, which since 1881 has risen by close on 20 per cent, and the fact that industries other than agriculture offer little alternative employment, has resulted in a pressure on the land which, though less than in other provinces still leaves many cultivators with holdings too small for full time occupation.

The pressure of the people on the soil is shown by the following figures: In Sialkot, Amritsar and Jullundur districts there are from 400 to 500 persons to the square mile, and there are localities outside urban influences in these districts where it may even

reach 800. In the dry western districts of Dera Ghazi Khan, Muzaffargarh and Mianwali the population per square mile falls below 100. In general, outside those canal colonies in which population has not yet overtaken production, the density is determined by rainfall and the fertility of the soil. "In India," to quote Mr. Darling, "every advantage of nature is sooner or later neutralised by an increase of population. It may almost be said that the fertility of the land is a measure of the fertility of woman."

The sub-division of land which has taken place because of the customs of inheritance, which give to each son an equal share in the father's land, is made worse by fragmentation. Not only must the value of the property be divided between heirs, but the actual fields themselves are also divided. Thus in such districts as Jullundur where a fertile soil, irrigation from wells, and a moderate rainfall have resulted in a dense population, the fields have been divided up to an extent which has offered a severe handicap to successful tillage. It is in this area, as will be noted under Co-operation, that co-operative societies for consolidating scattered holdings have been most active.

The peasant is illiterate, some 4 per cent only of the rural population can read and write; nor, as a rule, does he consider that literacy and land cultivation have much in common. He is still apt to be sceptical of the views advanced by his practical instructors, except where, as in the canal colonies, close contact has been established between himself and the Agricultural Department. But since the 1921 census was taken there are already signs that, as a result of the work of the Co-operative Education and Agricultural departments, his traditional views on education and its value are undergoing change. Men who have been in France with the armies, or who, in search of work, have penetrated to lands as distant as China, Australia or Brazil have returned home with new ideas, and are leavening the too solid mass produced by local tradition and experience. As a cultivator, his virtues are both high and low. The Chinese gardener would find a competitor in the Arains of Jullundur, or the tobacco cultivators of the Chhach; the Jats of the Central Punjab could match themselves against the Kunbis of Gujarat, the Belgian small-holder, or any other peasant who by his industry and skill has made a name for his cultivation; the Rajputs, except that they could not allow their women to work in the fields, would be entirely happy in the agricultural atmosphere of a southern Irish county; and there are tribes, which may remain nameless, who are very successful in supplementing the meagre produce of their land by cattle-lifting.

As a man the Punjab cultivator, especially the cultivator of the Northern Division, has given many proofs of his quality in the Indian army. When on gala days he turns out to compete in an inter-village tent-pegging competition, his horsemanship does credit to the cavalry regiment to which he once

belonged, and on occasions when he displays in public a carefully treasured uniform, the medals on his breast betoken varied experiences gained far beyond his native Punjab.

As a man, too, the Punjab cultivator gives many evidences of human frailty. Without distinction of tribe or religion, he is inclined to indulge in litigation; this being almost his only mental relaxation. He cannot read, he does not listen to weekly sermons, the village does not support a theatre, and if strolling players there be, they do not often come his way. On the other hand, pleaders are everywhere, courts are numerous, and argument, though it be expensive, some moneylender will readily help him to buy. His debts, as we shall presently see, are in many cases so heavy that he has no expectation of being in a position to repay them. When, therefore, fortune sends him a good harvest the toil of yesterday and the needs of to-morrow are forgotten; he enjoys himself and spends freely, for what is left over his creditors will annex. If he be a Sikh he may not smoke, if he be a Mahomedan he may not drink, but drink and tobacco are not the only forms of wasteful expenditure open to him; and in buying ornaments and other non-essentials even an orthodox Hindu, who touches neither drink nor tobacco, can, if so minded, dissipate the little store of rupees that should go to reducing his mortgage or improving his land. The thrift of the French or the Scottish peasant is a rare virtue in the Punjab.

He is, as has been said, in many cases an excellent cultivator. He is more careful of his cattle than are most Indian ryots; the working of his land is intelligent, and scientific study in many cases confirms the soundness of the principles which he follows. He displays, however, a certain tendency to let the morrow take care of itself, and this, joined to a lack of business capacity the result of lack of education, and to the simplicity of mind that he brings to bear on the happenings of nature, often proves the undoing of the frugal, hard working Punjab cultivator. His particular industry, in whatever country it is successfully carried on, requires either the possession of capital, substantial in amount in relation to the annual net output, or cheap credit. The capital of the cultivator is in his land, his bullocks, his implements and his seed corn. The major part, that in land and bullocks, is subject to rapid changes in amount. The father, if a landowner, may be a substantial man, his sons, even if only two or three in number, inherit land that may prove too limited for the needs of their families. Cattle disease is rife, and at any time most of his working capital may disappear with the death of his bullocks. Except in the canal-watered areas, shortage of rainfall may cause the crops to fail, and even where canal water is available bad weather may involve poor harvests. Thus, even to the substantial zamindar, credit may become a necessity at some period. Then, apart from his business, there are many calls for ready money. Social obligations involve expenditure on marriages

and funerals, and religious observances must be fulfilled. In no country can social obligations easily be set aside : in India they are a tyranny. The Punjab peasant must pay or become a dishonoured man. These being the conditions under which he lives and works, it is not surprising to find that most cultivators are reduced to borrowing.

Agriculture is the greatest and moneylending the most profitable industry in the Punjab. One cannot readily measure the income derived from moneylending against that derived from agriculture; but it may be noted that income tax collections in the Punjab, in 1925-26, amounted to Rs.9.67 lakhs from bankers and moneylenders, as against Rs.8.88 lakhs from all manufacturers and industries. And if on the basis of land revenue collections it is argued that agriculture in the aggregate must show a much greater gross income than moneylending, the investigations of Mr. Darling and others may be cited to prove that it is mainly into the pocket of the moneylender, and not into that of the cultivator, that the actual profits of agriculture now find their way.

In examining the work of the co-operative societies it will be found that there are exceptions; but as a broad general statement it is correct to say that once the cultivator falls into debt the difficulties of clearing himself are very great. Compound interest at high rates, the uncertainty of harvests, the cultivator's lack of literacy and of account-keeping of any kind, the immediate calls for cash which even a frugal man must inevitably experience, and the system on which the lending business is worked all combine to make the moneylender master of the situation. As the lender's policy is to remain master, and to increase the amount of the capital lent, rather than to call up loans, the volume of indebtedness grows; it has grown rapidly in recent years because the rise in the value of land has added to the security which the debtor can offer.

In the absence of thrift, agriculturists must have credit, and until he is replaced by other means of credit the moneylender must remain an essential partner in the agricultural industry. From the point of view of the industry (as distinguished from the point of view of the cultivator himself) the serious matter is that the moneylender is a bad partner. He gives credit of the wrong kind, it is of the seductive type so often fatal to the thoughtless borrower, and he takes no care to see that his loans are applied to productive purposes. It is all one to the moneylender whether a peasant borrows for the purchase of bullocks, or for the marriage of his daughter, for the sinking of a well or for carrying on a law suit. The result is that land in the Punjab bears a dead load of unproductive debt, which greatly hampers the efforts of those who are endeavouring to promote the prosperity of the cultivator.

In illustration of the evil a few facts from Mr. Darling's book may be cited.

The total average mortgage debt on Punjab cultivated land is Rs.31 per acre or twenty times the land revenue. In general the higher the security available the greater the debt. Thus, in such districts as Amritsar and Gurdaspur, where the soil is fertile and irrigation is practised, it rises to Rs.66 and Rs.49. In the poor, unirrigated districts of Dera Ghazi Khan and Hissar it falls from Rs.13 to Rs.6 per cultivated acre. There are exceptions to this rule, e.g., in the fertile colony land of Lyallpur it is only Rs.20, but Mr. Darling points out that the colony is young, and that most of the causes of indebtedness have not yet arisen there. A very interesting contrast is drawn between Lyallpur and Ferozepore, two districts enriched in recent times by canal water. In the former picked colonists, favourably situated, have amassed wealth, and incurred little debt; a good deal of the money borrowed has, moreover, been borrowed for productive purposes. Here there is real prosperity. In Ferozepore water, coming through the exertions of canal engineers, was accepted by the people as a windfall from heaven. There was a great expansion of the cultivated area, and with high prices and improved communications a marked increase of wealth followed, accompanied as usual with a corresponding development of credit. In spite of epidemics, there has been a considerable increase of population, but not as yet sufficient to counterbalance the increase of area under crops; many of the people became relatively wealthy, but others have succumbed to the temptations of a too facile credit, and the district has now the largest mortgage debt in the province although it is one of the most prosperous. In an enquiry which embraced 1,941 landowners, only 9 per cent were found to be free of debt, and the average debtor owned Rs.655. It is estimated that the total debt, secured and unsecured, in Ferozepore district must amount to Rs.7 crores, or to 38 times the land revenue. Careful inquiry suggests that little of this heavy debt has been incurred for productive or even useful purposes. Much is due to extravagance, a certain amount to expenditure regarded as necessary, and a small proportion to the satisfaction of agricultural needs.

The total debt of landlords in the Punjab is estimated by Mr. Darling at Rs.90 crores. The interest payable on this debt is a huge sum. It is not possible to estimate the average rate of interest with any accuracy, but it is believed that it cannot be less than 25 per cent. If the interest is unpaid it goes to swell the loan; thus it may be stated that the interest now accruing annually on zamindars' loans must be about Rs.22 crores, or five times the land revenue of the province and about seven times the income-tax collections.

With the establishment of British rule and peace in the Punjab, land, which before that time had had little or no market value, began to rise in price, and its importance as a security soon attracted the moneylender's attention. In the

last quarter of the nineteenth century it had begun to pass in alarming quantities into the hands of this class, who did not cultivate it themselves but leased it to tenants, with the result that there appeared a danger of the land passing from the ownership of the hereditary cultivator, an economic revolution which could hardly be regarded without misgiving. To check this tendency the Punjab Alienation of Land Act, 1900, which is referred to on a later page, was passed and a check imposed upon mortgaging to non-agriculturists. Echoes of the grave situation may still be heard in the country-side in the folk-song :—

Je n̂a hon̂da Thorburn
*Tan̂ hon̂di Pindi Chaur-Chapat.**

Whereas in 1901 about 3,250,000 acres of land were mortgaged, by 1924 the area had fallen to 2,900,000 acres, but as land has risen much in value, the mortgage money, on transactions in 1901 was about 53 times the amount of the land revenue due on the property, and in 1924 was no less than 127 times the land revenue on the area mortgaged in that year. Mortgaging to neighbouring cultivators has, since 1901, become a very common practice; an enquiry made in Ferozepore district disclosing the fact that zamindars were there exchanging property so freely that land had in effect become a new form of currency.

In describing co-operation further reference will be made to the cultivator's financial position; enough has been said here to indicate that the Punjab peasant, and those who work for his betterment, have difficulties to contend with which cannot be ascribed to the soil, or climate, or even, as many reformers would have it, to the Government, but are inherent in himself and in his relations with his neighbours.

6. THE AGRICULTURAL AND VETERINARY DEPARTMENTS.

A description of the work of the Agricultural Department will be found in the evidence given by the Director of Agriculture, and the Principal and members of staff of Lyallpur College. As an introduction to this evidence it will be convenient to summarise here the main facts relating to the history and activities of the department. The work as now planned falls into three sections—investigation, education and propaganda. It centres round the Agricultural College at Lyallpur and a reference to this institution and its development may first be made.

Work at Lyallpur began in May, 1901, when the Director of Land Records and Agriculture established there an experimental farm of 54 acres, representative of the colony-land watered by the Lower Chenab canal. In 1905 a technical deputy director of agriculture was appointed, and the farm was enlarged to

* If Thorburn had not been there, Pindi (district) would have gone to pieces.

300 acres. At this time the Government of India resolved on a forward agricultural policy and provided for the purpose 20 lakhs of rupees per annum. Of this sum 2½ lakhs were assigned to the Punjab. A college at Lyallpur was then planned at an estimated cost of 4 lakhs and the buildings were completed and occupied in 1909. Meantime, in the autumn of 1906, a professor of agriculture and a chemist began work at Lyallpur and in the following year an economic botanist was appointed. These officers were engaged in investigations to be subsequently referred to until, in 1909, the college was ready to receive students.

A large number of candidates, some 400 in all, applied for admission to the new college, but in the first year the entry was limited to 16 students. A three-year diploma course was planned, partly to train workers for the Agricultural Department, and partly to meet the assumed demands for instruction of sons of the larger cultivators in the canal colonies; but, as elsewhere in India, it was found that government service was the goal of all candidates for admission, and when it was discovered that the demand for government officials was quite limited, requests for admission to the three-year course fell off rapidly, until in 1913 there was not a single applicant. This led to a revision of the courses. For those who desired an extensive training, with the object of qualifying for the better posts in the Agricultural service, a four-year diploma course was offered; for others, whose school qualifications, or whose means made the study of the sciences bearing on agriculture impossible, there was provided a two-year course in practical agriculture leading up to a college certificate. A few of these certificate students were to be eligible for employment in the department's lower posts; the others were expected to go back to the land. Finally, in 1917, the college was affiliated to the Punjab University and the four-year diploma course was remodelled into a course leading up to a B.Sc. degree in Agriculture.

In addition to the four- and two-year courses, there are three shorter courses of study. The first of them to be provided was a six months' vernacular course intended for zamindars' sons. It was begun in 1912, and is well attended. In 1918 a one-year course was instituted for training certificated teachers to give agricultural instruction in the rural vernacular middle schools which have already been described. In 1916 a one-month course was instituted for recruits to the Indian and Provincial Civil Service in the Punjab, with the object of explaining to young administrative officers the scope of the department's activities and the possibilities of improvement offered by local agricultural practice. Experience has shown that officers who have gone through this course have subsequently done valuable propaganda work.

In recent years applications for admission to the college have varied from 108 to 300, and the number annually enrolled from

53 to 64. In 1926 there were on the college rolls 261 students, viz. :—

Degree course students	162
Two-year certificate course students	23
One-year teachers' course students	32
Six-months' vernacular course students ...	43

The average cost of education to students attending college courses is Rs.45 per mensem. Scholarships are awarded by Government and by district boards. The aggregate annual value of these scholarships is about Rs.16,700.

The increase in the attendance at the college has necessarily involved addition to laboratories, class rooms and hostels. The residential accommodation in 1926 provided rooms for 186 students, and a new hostel, now building, will house a further 126.

Lyallpur provides the Punjab with both a college and a research institute. The staff is common. With the increase in the college itself there has been a large increase in the amount of experimental work. The teaching, research, field experiment and clerical officers now number 160 and there are, in addition, some 280 laboratory attendants and workmen either employed in the buildings and on the experimental fields, or working in the province from the college as headquarters.

The original 54 acres of land taken up in 1901 for experimental work have now been extended to 761 acres which are used as follows :—

	Acres.
College experimental farm	460
Students' training farm	71
Dairy farm	20
Botanical research	110
Entomological research	4
College site and grounds, staff bungalows ...	96

With the exception of a small piece of sandy land above the level of the canal, the whole area is irrigated, and it consists of a level tract of deep alluvial soil, light in texture, and admirably adapted for experiment work. The absence of rain, the facilities for irrigation and the easily-worked soil enable markedly uniform crops to be grown. The absence of variation in individual experimental plots is in striking contrast to the results that must usually be expected on the undulating fields and in the uncertain climate of Britain. The general impression given by the college estate is that here the experimentalist works under very favourable conditions. Insect and fungus pests have to be reckoned with; but the facilities for study afforded by the adjacent laboratories, and the equipment at the disposal of the college, enable most of them to be kept in control. The farm buildings are extensive, there is available a wide range of European, American and Indian cultivating and other implements, and there are workshops in which repairs can be carried

out. It is on this college estate that the improvements recently introduced into Punjab agriculture have mainly originated, and some account of the work may be given before referring to the district agricultural work being carried on in the province.

If the college estate can claim to be the focus of agricultural activity in the Punjab, the botanical research area may claim to be the focus of the estate. Cotton and wheat have received, and still receive, most attention; but the improvement of a number of other crops is undertaken. Quite recently, under an arrangement made with the Indian Central Cotton Committee, cotton has been given a section to itself; a cotton research botanist has been appointed, a new laboratory has been built, standing in its own 18-acre experimental field, and a farm of 200 acres has been acquired a few miles from the college for the further testing of the new cottons being introduced. From 1907 until 1923, however, cotton improvement formed a main preoccupation of the economic botanist.

In 1907, when botanical work began, two classes of cotton were found growing in the Punjab; by far the most common was the native Indian or *desi* crop, consisting of short staple growths of the species *gossypium neglectum*, or less commonly *G. sanguineum*; the other was a cotton of American origin (*G. hirsutum*) whcih had reached the Punjab from various sources, mainly from Dharwar. This American cotton was grown under irrigation in several districts, but was in no great favour with cultivators, and making little headway. On examination by the economic botanist, it was found to consist of a mixture of types, some of them obviously of a superior quality. In 1910 seed of a promising type which had then been selected from the mixture was passed on to be tried on the experimental farm, where it proved to be of high value. It was distributed to cultivators as Punjab-American 4-F and it found so much favour that in 1926 over a million acres of this variety was grown in the province. Meanwhile, as the result of further study, several other cottons of still better quality were isolated from the same group, and two of these, 285-F and 289-F, are being grown on a considerable scale. The staple of ordinary *desi* cotton measures from .5 to .7 of an inch and spins from 6s to 10s counts. Punjab-American 4-F has a staple of about .9 of an inch and spins from 20s to 25s counts, and 289-F has a staple of 1.2 inches and spins from 50s to 60s counts.

About one-half of the cotton area of the Punjab is still occupied by *desi* cottons, and it is unlikely that they will be superseded, for the American types are not suited for unirrigated land, and even where irrigation is available local conditions may indicate the indigenous types as the more suitable, since they admit of later sowing. Attention has, therefore, been given to the selection of superior strains. While no such marked improvement over the ordinary crop has yet been secured as in the case of exotic cotton, the mixed country

cottons have been separated into four more or less pure strains, each possessing some quality commending it to the cultivators of some locality, and it is anticipated that as a result of further study superior strains will yet be discovered.

It should be noted that the improvements in cotton so far effected have resulted from the discovery, isolation and growing on of superior strains occurring naturally in field crops. Hybridisation is now being resorted to in the hope of artificially producing new strains of better quality than those found in the existing crops.

Work on wheat has followed the same lines as in the case of cotton. From 1908 onwards a study was made of the types discovered among mixed field crops and many were isolated. The first to show high merit was the wheat known as Punjab No. 11 which, in 1926, occupied some 625,000 acres. This wheat was one of those originally isolated by Pusa investigators; but it showed no special merit in the Pusa district. Proof of its value for the Punjab was obtained at Lyallpur. By continued selection a second wheat of much value—Punjab 8A—was isolated. It is not only a better yielder, but produces a better flour than No. 11, and it is superseding this variety. In 1926 some 830,000 acres were being grown from seed supplied by the department.

Just as the best wheats distributed widely by Pusa, and largely grown in the United Provinces and elsewhere, have not commended themselves in the canal colonies of the Punjab, so the best Punjab wheats are seldom popular further south, and not even in the Peshawar valley in the extreme north. This illustrates a general experience among agriculturists. By whatever process a new variety may originate, whether as the result of selection or of cross-breeding, its value to a locality can only be determined by rigid tests conducted in that locality. It is recognition of this fact that governs much of the experimental work at Lyallpur. The larger part of the botanical area (as distinguished from the area assigned to the special officer in charge of cotton) is now occupied by an extensive series of selections of wheats; some of them picked out from existing crops, others the result of hybridising. The special qualities of these wheats are carefully noted, the most promising are passed on to the experimental farm, and there, after further tests, if they prove satisfactory, are multiplied for distribution to seed-growing farms in different parts of the province.

The work of the chemical section at Lyallpur, like that of the botanical, partly consists of intensive studies of subjects to be further worked out on the experimental and dairy farms, and partly of work arising out of investigations in progress in other parts of the province. As an illustration of the former type of work may be instanced the investigations now in progress on animal nutrition. The digestibility of the more important feeding stuffs is being determined by trials conducted on cows

and bullocks; while the effects of foods on milk production, and the feeding value of new types of fodders—with special reference to materials that might be employed in times of scarcity—have recently received special attention. A new digestion stall accommodating six animals, with facilities for the separation of dung and urine, has been provided for these experiments on cattle.

Investigations of the second type, that is, work carried out at Lyallpur in association with experimental farms, or observation plots in other parts of the province, now cover a wide range of subjects. The nutrition studies are being extended to samples of fodder from all parts of the Punjab; while it is worthy of note that special attention is being given to the mineral content of the natural grasses in districts where there is reason to suspect deficiencies. Co-operative manurial experiments are conducted, green-manuring, and the uses of ordinary artificial manures have been investigated. A sugarcane survey has been undertaken, and many local and introduced varieties have been analysed. Waterlogged soils and salt lands have been examined, and special experimental treatment has been devised with a view to the reclamation of such barren lands. A large number of samples of Punjab soils have been collected and analysed.

An entomological section has been at work since the college started; in 1919 it was reorganised and much enlarged, and now, in addition to teaching and research work at Lyallpur, it employs a staff for dealing with insect pests in the province. Under its supervision many thousands of fruit trees are sprayed each season. At the present time, in association with the Indian Cotton Committee, much time is being given to studies of the pink cotton bollworm, whose ravages are specially severe in the south-eastern Punjab. The adjacent tracts of the United Provinces also suffer from this pest, and parallel studies of methods of control are being made at Cawnpore. Treatment of cotton seed with hot water before sowing has been found very useful. Other insects now receiving special attention are cotton-, sugarcane-, maize- and rice-borers, and fruit pests such as the mango hopper and the psylla of citrus trees.

With the object of studying the feeding-habits and life-histories of injurious insects, an insectary has been provided, and four acres of land are set aside for observational and experimental work.

The section is also charged with fostering sericulture and lac cultivation in the province.

An agricultural engineering section was started in the college in 1915, and in 1920 new workshops were provided with offices for draughtsmen and clerical staff. From this centre the work of improving irrigation from wells within the province is conducted. Special attention has been given to increasing the water supply in ordinary wells by boring, and to providing deep

tube wells, where these are suitable. A new power-boring machine has been designed, and an improved type of strainer for preventing the choking of bore holes with fine sand has been introduced. Three power-boring machines and 72 hand-boring plants are now at work, and the number will shortly be increased to 10 and 140 respectively.

Hitherto the demands on the time of the engineer in connection with well-irrigation have not allowed of much attention being given to the designing of new machines and implements; but a special engineer is now to be employed on this work, as the experience already gained shows not only that there is scope for better designs, but that with skilled assistance it will not be a difficult matter to effect improvement.

The large experimental farm is employed in testing and developing the work of the laboratories and research fields, for in dealing with Indian cultivators it is of special importance that nothing which has not been thoroughly tested should be brought to their notice.

The farm consists of two sections. About half is leased out to tenants and the remaining half, the most suitable for experimental work, is laid out under crop-variety tests, rotation experiments, manurial trials, and irrigation experiments. From what has already been said on the work of the scientific sections, the scope and purpose of the experiments will be inferred, and one experiment only, that on "Intensity of Cropping," need be referred to because of its general interest.

In Indian agriculture fallowing takes an important place as a means of cleaning and improving land; but it is known both that Indian soils are specially deficient in humus, and that there is in them a large production and loss of combined nitrogen. It was therefore argued that provided the land can be kept clean, the greater the intensity of cropping the better the result should be, for root residues would add humus and the growing of crops would prevent the loss of combined nitrogen. To test the correctness of this theory, advanced by the then Professor of Agriculture, a series of rotation experiments was planned in 1920. About 25 acres of level and uniform land was divided into four blocks which may be designated as R1, R2, R3 and R4. Each block carried a three-year rotation of crops. The first of these was a common local rotation wheat—fallow—cotton. The fallow was relied on for land improvement, and it will be seen that the intensity of cropping was 66 per cent. R2 consisted of wheat—gram—cotton; thus the intensity of cropping was 100 per cent and a leguminous crop was relied on to effect improvement. R3 consisted of a leguminous crop, *guar*, ploughed in, followed by wheat-rape cotton; intensity of cropping 133 per cent with a leguminous green manure to effect improvement. R4 consisted of wheat—mixture of *fowar* and *guar* (for fodder)—gram—cotton—*senji* (an annual medick); here the intensity of cropping is 166 per cent, three

leguminous crops are grown, and additional fertility has been imparted by the direct application of 10 tons per acre farmyard manure to the cotton crop.

The financial returns for two three-year rotations are now available and are as follows:—

	First rotation. Rs. As.	Second rotation. Rs. As.
R1. Average net income per acre per annum	36 13	95 3
R2. Ditto	45 2	115 11
R3. Ditto	56 4	124 15
R4. Ditto	66 5	152 3

It will thus be seen that the more intense the cropping, the greater was the net income, and also that the final figure suggests a marked increase in value to be due to the direct application of farmyard manure.

The above experiment has been referred to as an illustration of the work at Lyallpur, but the results are of much general interest as bearing on the possibility of increasing production on irrigated land. Given water, active bullocks and seed of the right kind, there would seem to be no reason why cropping should not be intensified, and fertility enhanced, by following methods suggested by sound theory and approved by six years' practical experience.

The section of the experimental farm which is let out to tenants is not let unconditionally, but is used to promote the objects of the department. New varieties of crops, which show sufficient promise under experimental conditions, are passed on to the tenants so that their value, under the ordinary methods adopted by the Punjab cultivator, may be ascertained before they are distributed to the agricultural public.

While the stock and crops on the experimental farm are available for teaching purposes, they are not subjected to the prentice hands of students. For giving practical instruction, so very necessary in the case of Indian students, there is a farm of 71 acres worked by the students themselves, who are required to undertake all the usual farming operations, including the care and feeding of the working cattle.

Side by side with the development of the investigations and educational work at Lyallpur there has gone on an expansion of district work. Some reference to this has been made incidentally in describing the activities of the college. It will now be necessary to allude further to the work proceeding within the province.

In July, 1906, a separation was effected between the Departments of Land Records and Agriculture, which had hitherto been under a single director, and a director of agriculture—an Indian civilian—was appointed. When in the autumn of the same year a principal was appointed to Lyallpur, the

deputy director, who had previously taken charge there, was set free for work throughout the province. In the following year the Secretary of State authorised the employment of three deputy directors, but it was not until 1914 that the third appointment was made. The province is now divided into five circles, each in charge of a deputy director, and proposals have recently been made, and approved in principle, for the employment of three additional deputies. The present organisation, however, is on the basis of five circles, the headquarters of the deputy directors being Gurdaspur, Hansi, Montgomery, Multan and Lyallpur. Subject to the general supervision of the Director and assistant director, whose headquarters are in Lahore, the five deputies are responsible for all the work proceeding in their respective circles, except that in the case of Lyallpur the college—the focus of all this district work—has its own Principal. The five deputies are members of the Indian Agricultural Service with salaries (exclusive of overseas pay) rising from Rs.350 per mensem to Rs.1,250 as a maximum. Immediately under them are nineteen extra assistant directors stationed at appropriate centres throughout the province, who are members of the Provincial Agricultural Service drawing salaries of Rs.200 per mensem rising to Rs.750 as a maximum. Under the assistant directors there is a corps of agricultural assistants, separated into two groups. Group A consists of men who have passed the B.Sc., or diploma examination, or who have been promoted for special merit. They begin on salaries of Rs.100 and may rise to Rs.300 monthly. Group B consists of men who have taken the college certificate after a two-year course. They enter the service at Rs.70 and may rise to Rs.180. Including the assistants stationed at and working from the college as a centre there are now some 140 in the A and 50 in the B Class.

The provincial staff is employed in managing seed and experimental farms, in conducting local experiments and in lecturing and propaganda. A large extension in district work including the provision of many more farms is, as already stated, in contemplation; for the present the facilities for local experimental and other work are the following :—

In the First, or Gurdaspur Circle, there is an experimental farm at Gurdaspur of 161 acres; six government or district board farms of from 43 to 54 acres, located at suitable centres throughout the circle; a seed-growing and experimental farm of 500 acres at Sargodha, and a second farm of 250 acres of the same type at Chilianwala. In the Second (Hansi) Circle, there are at Hansi itself an experimental farm of 589 acres, and three local demonstration farms of 40, 52 and 100 acres respectively. In the Third (Lyallpur) Circle, in addition to the properties attached to the college, there is a seed-growing farm of 878 acres. In the Fourth (Montgomery) Circle are two seed-growing farms of 250 and 275 acres respectively, a district

board demonstration farm of 46 acres, and an experimental farm of 558 acres which has a special problem the reclamation of *bara* land, that is, land with a high percentage of salt and a peculiarly intractable texture. In the Fifth (Multan) Circle there is a seed-growing farm at Multan, and a demonstration farm at Mianwali.

To this list of permanent centres for developing the agriculture of the province, there must be added the livestock improvement farms, which will be referred to subsequently, and the grantee farms, the latter, of which there are about half-a-dozen engaged in crop improvement, consist of large tracts of land varying from about 2,500 to 7,500 acres granted on condition that the grantees take a share in experimental work, demonstration, and seed-growing. These large and well-managed farms have been of special value to the Agricultural Department in testing out new processes, in growing on pure strains of seed, and in providing data for estimating the cost of production of crops. As showing the relation between science and practice in the province, it is interesting to find that two of these farms extending to some 10,000 acres, one leased by a British company, the other by a substantial Indian landowner, are now under the management of a former member of the college staff, and that the size of the crops and the success of the farming are attracting widespread attention.

It is unnecessary to refer here to the character of the work for improving crop-production that is being carried on by the Agricultural Department. It is described in the evidence and its general nature may be inferred from the facts already given; but it should be noted that in addition to the problems of crop-growing, the officers of the department have given close attention to questions of marketing. It was found, for example, that the spread of improved cotton was being hindered by malpractices, or by carelessness. Traders could be induced to offer no more for the small quantities of high-grade cotton produced in the earlier years than for unimproved country cotton; and, when the bulk of the long staple variety increased, the practice of mixing good or bad staples was reflected in the prices procurable by the grower. Special steps were therefore taken to organise auctions of Punjab-American cotton and to safeguard its reputation. This action by its effect on prices markedly assisted the spread of the new introduction.

Livestock Farming and Veterinary Work.—Schemes for the improvement of livestock are carried out by the agricultural civil veterinary and co-operative departments who attack the problems presented from different angles and work with a common policy.

The breeding of improved livestock is undertaken by a special branch of the Civil Veterinary Department, a department whose staff at present form a separate service under a Chief Superintendent, linked to the staff of the Agricultural Department

through the Director of Agriculture, who is in turn responsible to the Minister of Agriculture for the work of both services.

The improvement of cattle presents, as elsewhere in India, much more serious difficulties than the improvement of crops. Although the native breeds of the Punjab are among the best cattle to be found in India, there exists here, as in other parts of the country, the difficulty of providing fodder throughout the year; indeed, owing to the dry climate, scarcity is more pronounced than in many provinces. Before the wide expansion of cultivation rendered possible by the extension of canal irrigation, the need for plough cattle was much less than it now is. Formerly there were extensive areas of waste land, over which wandering herdsmen roamed in search of fodder for their livestock; natural selection played a part in the survival of the fittest, i.e., the most active and enduring of the cattle, and the herdsmen themselves were not devoid of the eye and instincts of the breeder. As population increased and man came into competition with his cattle for the scanty produce of the soil, the lot of livestock became harder; but when the British first reached the south-east Punjab, they found there as fine a class of bullock for military transport as India could then produce; and in the dry district of Hissar, they established a great farm of 42,000 acres for breeding these Hariana cattle for the army. That farm still exists. Some twenty-five years ago it was handed over to the Punjab Government, and it is now used for breeding Hissar bulls for distribution to district boards working livestock improvement schemes. Unfortunately, throughout its long history the Hissar herd has not always been wisely managed; the passion for experiment has at times prevailed over the knowledge of the cattle-breeder. Cattle of good quality from other parts of India were introduced, and crosses appear to have been made—as they are still being made in some parts of India—just to see what would happen! As a result the Hissar herd lost some of its original characteristics. The policy, which has been followed since the present management took over charge of Hissar farm, has been to restore the herd to the original Hariana type; and except in the case of a few of the older cows, the Hissar cattle now exhibit that degree of quality and character which should be regarded as essential in a herd maintained for the production of bulls for the improvement of draught-cattle. The best of the young bulls left when fit for service are sold at an upset price to representatives of district boards and co-operative societies responsible for cattle improvement. The supply is not equal to the demand, and efforts are directed towards supplying those villages where the best use is made of good bulls. The chief difficulty met with in the initial stages of improvement is that many of the village cows are so poor in quality and so badly fed that there is no chance of a satisfactory calf, however good the bull. In the better organised districts, measures are taken to prevent pedigree bulls from being mated

with valueless cows. A second difficulty lies in the existence of worthless wandering bulls. There is no certainty that a cow, itself the result of a satisfactory mating, may not be served by one of these; alongside the campaign for the better treatment of cows, there is also carried on a castration campaign, for reducing the number of inferior bulls. Where, as in Gurgaon district, both these difficulties have been resolutely tackled, a rapid improvement in livestock may be looked for, and there is a keen demand for more Hissar bulls by district boards and live-stock improvement co-operative societies.

The total size of the Hissar herd is about 4,000, the number of cows 1,450, and the number of young bulls suitable for service sent out in the year 1925-26 was 406. There has recently been a rapidly increasing demand; but the supply falls far short of the needs. The actual number of Hissar bulls at stud is at present under 2,000. It was estimated in 1920 that the province as a whole requires 50,000 bulls; and even if it be assumed that cattle of the Hissar breed are suitable for distribution in not more than one-third of the province, it will be obvious that a largely increased supply of pedigree animals of this breed is required. The Hissar herd is to be enlarged; meantime the Civil Veterinary Department are developing ancillary farms. Grants of land on special terms are made to agriculturists who undertake to breed Hissar cattle. At present three of these farms, of an aggregate area of about 5,250 acres, and maintaining 925 Hissar cows, have been established in the Lower Bari Doab canal colony.

In the north of the province there is found a second breed of draught cattle—the Dhanni—very different in appearance and qualities from the Hariana or Hissar type, and as popular with cultivators in the north and western districts as Hariana cattle are in the south-east Punjab. A start has been made in the improvement of these cattle by using selected Dhanni bulls. Cattle-breeding associations have been formed in the Rawalpindi, Attock and Jhelum districts. A herd book for Dhanni cattle has been established. Approved bulls are allocated to selected villages. These bulls are the property of private owners to whom a premium is paid in aid of maintenance; the premium may be as much as Rs.20 per mensem.

A third notable breed of cattle found in the Punjab is the Sahiwal or Montgomery. This is one of the few Indian breeds that possesses good milking qualities, and in recent years the native stock has been much depleted by sale to town dairymen, or to Military dairy farms. To preserve the quality and maintain the supply of this breed the Civil Veterinary Department have established five farms in the Montgomery district. These farms maintain some 1,200 pure bred cows and have an aggregate area of about 12,000 acres. In addition government land is being leased out to members of certain cattle-breeding tribes

on the condition that they maintain a specified number of Montgomery cows for breeding pure stock. With the object of encouraging the improvement of milking cattle the department is, at Hissar and elsewhere, also resorting to milk-recording.

The total number of selected bulls provided under the Government's cattle-breeding schemes in 1925-26 was 616, and on the 31st March, 1926, there were 2,253 stud bulls owned by local bodies undertaking cattle improvement. Gurgaon district alone had 463.

To a limited extent the improvement of sheep is receiving attention. The Hissar farm maintains a flock of from 450 to 500 ewes. Merino rams have been used in crossing and selected rams from the cross-bred flock are being supplied to a few co-operative societies formed for promoting sheep farming; but considerable results cannot yet be claimed.

Hissar farm breeds a small number of Arab horses and donkey stallions for mule breeding; but with this work the Civil Veterinary Department have now little direct connection. Horse and mule-breeding operations were, in 1903, transferred to the Army Remount Department which has organisations for the purpose in twelve of the Punjab districts. As in other cases, grants of government land have been made to private individuals on condition that they co-operate with the Remount Department. In the Lower Jhelum and Montgomery district alone some 300,000 acres are being granted on certain conditions to cultivators who engage in horse-breeding, and in the Lyallpur district some 40,000 acres are similarly granted in aid of mule-breeding.

The main work of the Civil Veterinary Department is not the breeding of livestock but the prevention and treatment of disease, and here, as in the case of the Agricultural Department, a reference may first be made to the college. Among Indian educational institutions this college has quite a long history; it began in 1882, when a veterinary school was founded to provide a two-years' vernacular course. This course was in 1899 increased to three years. In 1919 the scheme of training was entirely remodelled. The school, affiliated to the university, became a college; the course was extended to four years, and English replaced Urdu as the medium of instruction. The standard for entrance was henceforth the matriculation examination of the university, and the diploma of L.V.P. (Licentiate in Veterinary Practice) was offered to successful students. Since that time the college has been provided with extensive and well-equipped buildings; including not only class-rooms, teaching laboratories and hospitals, but research laboratories, much exceeding in spaciousness and material opportunities for study anything that the veterinary colleges of Great Britain can show. In 1926 the staff consisted of a principal and eight professors, and there were 112 students on the college roll, of whom seven had already taken the diploma and were engaged in advanced studies. From 4,000 to 5,000 cases of

disease are annually treated in the hospitals. For the study of surra a special laboratory was established in the north of the province. Valuable work was done which, unfortunately, has been interrupted by the resignation of the officer in charge.

As in the case of agriculture, the students look forward mainly to government employment for a career.

For veterinary work the province is divided into three Circles each under a superintendent, one of whom is also Chief Superintendent of the department. The Superintendent of the Northern Circle is also responsible for work in the North-West Frontier Province. Each superintendent has under him a deputy, and the provincial staff includes 27 inspectors, 7 veterinary assistant surgeons, and 226 veterinary assistants. In association with district boards, who establish and maintain veterinary dispensaries, this staff is engaged in treating sick and maimed animals all over the province, and in combating as best they can the spread of contagious disease. In the absence of legislation on the lines of the Contagious Diseases (Animals) Acts of Britain, it needs no description of their task to prove that the difficulties under which veterinary officers work are formidable.

Diseases are treated partly by members of the staff of the Civil Veterinary Department on tour, and partly at local dispensaries to which sick animals are brought. In 1925-26 the touring staff visited 22,600 villages, treated 120,000 sick animals and castrated 90,000 scrub bulls or bull calves. The veterinary hospitals (of which there are now 191), and the dispensaries had 24,000 in-patients, 574,000 out-patients and castrated 76,000 animals, of which 64,000 were cattle. Some 230,000 cattle were inoculated with serum (alone) against rinderpest, and 92,000 against hæmorrhagic septicæmia, and against the latter disease 148,000 were vaccinated.

The cost to the central Government of the Civil Veterinary Department was Rs.12.93 lakhs in 1925-26, hospitals and dispensaries accounting for 3.17 and livestock breeding and improvement for 6.16 lakhs. In addition, local bodies expended 2.75 lakhs on hospitals and dispensaries, and 2.87 lakhs on livestock improvement.

Horticulture.—It is recognised that there is a wide field for the fruit and vegetable grower in the Punjab, and the difficulties of the horticulturist are being met to some extent by the Entomological and other specialist sections of Lyallpur College. On the cultural and crop-improvement side a small amount of work has been done by the Economic Botanist, such, for example, as the introduction of the Arabian date-palm into Muzaffargarh; but it is agreed that much more requires to be done, and it has recently been decided to add fruit and vegetable specialists to the agricultural staff.

Pending further developments within the department, Government has sought to encourage horticulture by granting leases of State land on favourable terms, on condition that

experiments in fruit-growing are carried out. The most important of these grants was made in 1920. A farm of 720 acres in the Montgomery district was leased to a fruit-grower on condition that he would cultivate grapes and endeavour to establish a raisin industry. Climatic difficulties have been encountered, the ripening grapes are apt to burst during the rains, and varieties which ripen before or after the rainy season are being sought. Other farms of 125 acres and 75 acres respectively have been granted for general fruit culture. In these cases the prospects are more hopeful, but the trees planted are still young and definite success is not yet assured.

This outline of the development of the Punjab Agricultural Department may be concluded by citing the expenditure incurred at various periods as the department grew in size. In the post-War years the increase in salaries and other costs must be kept in mind. Otherwise the rate in growth of expenditure may be taken as a fair measure of the Punjab Government's effort. It will be seen from the evidence of the Director of Agriculture that the claim is made that the expenditure has been highly remunerative, and as Government contemplate large extensions of the department in the next five years, and the Legislative Council have already granted funds for the first part of the new programme, it may be inferred that the province is satisfied with the returns that so far have accrued.

The total expenditure on the Agricultural Department at five-year intervals from 1906-07 onwards is shown below. The cost incurred by other departments in providing buildings or land for the Agricultural Department has been included, but the cost of the Veterinary Department (which has been given above for 1925-26) has been excluded.

	Rs. lakhs.
1906-07	2.58
1911-12	3.00
1916-17	7.05
1921-22	19.23
1926-27 (Budget Estimate)	38.46

7. IRRIGATION.

The total area of irrigated land in the Punjab in 1925-26 was 13,819,000 acres. Of this area by far the greater part was supplied with water from the great system of canals. In regions which canal water does not reach, wells are the main source of supply. The total area irrigated from wells in 1925-26 was about 3,715,000 acres as compared with 4,612,000 in 1868-69. Of well irrigation it is unnecessary to write. As in other parts of India, water is lifted by the Persian wheel or the leather bag; bullocks, or occasionally, buffaloes supplying the power. In a few districts oil-engines are employed,

especially for pumping from deep (tube) wells. The main difficulty that confronts the cultivator depending on wells is the lowering of the water-table in certain tracts. Intense well irrigation exhausts the relatively small supplies of subsoil water existing in dry tracts; and the falling, by even a few feet, of the water table so greatly increases the cost of lifting that it may easily turn a prosperous into a wholly unprofitable form of cultivation. Uncertainty as to the water-supply available is now hindering the extension of deep wells, and experimental batteries of tube wells are projected in one or two important districts with the object of testing the effects of intensive pumping on the supplies afforded by shallow wells in the same localities. As will be mentioned later, scientific officers of the irrigation and agricultural departments are studying both the prospects of increasing the number of tube wells and the effects they produce on the subsoil water level.

The distinctive feature of Punjab irrigation is its canal system. While the magnificent waterways which now fertilise the province have been constructed mainly within the past half century, it must not be supposed that canal irrigation in the Punjab is a new thing. The oldest of the existing canals—the Western Jumna—owes its origin to Firoz Shah, in 1351, and its re-excavation and extension to Akbar in 1568. The words of a *sanad* of this great ruler are worth quoting:* "My wisdom," he writes, "wishes that the hopes, like the fields of those thirsty people, may, by the showers of liberality and kindness, be made green and flourishing, and that the canal may in my time be renewed, and that by conducting other waters into it, it may endure for ages. For God has said from water all things were made. I consequently ordain that this jungle, in which subsistence is obtained with thirst, be converted into a place of comfort free from all evil." In the seventeenth and eighteenth centuries irrigation was neglected, but early in the nineteenth the canal of Firoz Shah and Akbar was resurveyed and restored by the British engineers, Macartney, Blane and Colvin, and since that time the mantle of the Mogul ruler has fallen on a succession of British and Indian engineers, so that the Punjab, if not yet "free from all evil," is rapidly being converted into a province in which subsistence, formerly obtained "with thirst," is now obtainable in "comfort." When the projects in course of construction, or investigation, have been carried out, the dream of Akbar will indeed have become a reality.

It is possible to describe in words the Punjab canal system, and to show by figures the magnitude of the engineering works; but it is scarcely possible to convey to those who have not visited the province a conception of the change which irrigation has brought about on its scrub-covered wastes and sandhills. In

* Yule, "*Jour. Asiatic Soc.*," 1846; quoted by Buckley, *The Irrigation Works of India*, Allen & Co., London, 1880.

regions not yet reached by canals the traveller may still journey by train for hours across wastes consisting, it would seem, of hopelessly barren land; and on the following day, in one of the canal colonies, he may traverse wide tracts, patches of which, here and there left unirrigated, consist of the same thirsty sand, but in general now converted into cornfields so prosperous to the eye of the agriculturist that to describe the change he is compelled to make use of Akbar's imagery. It would seem that not moisture alone but " showers of liberality and kindness " have " made green and flourishing " this barren jungle. But in prosaic terms, the irrigation engineer will inform him that the change has, in fact, been brought about by the supply of 2.84 cusecs (cubic feet per second) of water per 1,000 acres through an A.P.M. (adjustable proportional module) from some minor water channel! What is it that the officers of the Irrigation Department have done and are doing?

Two types of canal may be distinguished. First, there are the inundation canals, many of them ancient, depending for their supplies on flooded rivers. These canals are numerous, but as a class they are unsatisfactory from the point of view of the cultivator, since the water supply is uncontrolled and uncertain and crops are liable to injury by the falling of river levels at critical periods, and, except in the Indus Valley, they will cease to exist when the irrigation programme has been completed. Of far greater importance is the second type of canal, for which by means of head works, a large volume is stored and from which a controlled supply can be provided either throughout the year or for a definite term which will ensure the autumn or the spring harvest.

In recent years the irrigation works of the Punjab have grown quickly and they are still in process of rapid extension. When in 1932-33 the Sutlej Valley canals, now in course of construction, have been completed, the Irrigation Department will be able to claim that they have some 15,000,000 acres annually under irrigation. Included in this large area there will be about 2,500,000 acres situated in Indian States; the necessary construction may, however, be claimed as their work by Punjab engineers; it has been, or will be, carried out by them on behalf of Indian rulers.

In 1924-25 there were in all nearly 20,000 miles of government irrigation channels in the Punjab, as compared with 11,000 miles at the beginning of the century.

Including 679,000 acres in Indian States, the area irrigated from government irrigation works in the year ending March, 1926, was 11,109,000 acres, as compared with 5,244,000 acres in 1900, and 2,341,000 acres only in 1887-88.*

About 5,096,000 acres of *kharif* crops were irrigated in 1925. including cotton, 2,414,000, rice 540,000 and sugarcane 160,000

* The figures for 1925–26 are gross and the earlier figures are net.

acres. In the following *rabi* season 6,013,000 acres were irrigated, including 3,593,000 acres of wheat.

The figures given above relate to the actual areas irrigated in a single year. The total areas commanded by the canals are much greater and these larger areas are irrigated in rotation. At the present time 20 million acres of land are commanded, and when projected canals and extensions have been carried out, this area will be increased to 36 millions. For comparison it may be noted that the irrigation works of Egypt and the Sudan command eight million acres.

Not only have Punjab canals converted sandy wastes into fertile tracts of country, but they have proved directly profitable to Government. On the works in operation at the end of 1925-26, a total capital outlay of about 23.54 crores of rupees had been incurred. By far the larger proportion, *viz.* : 23.15 crores, had been spent on productive works. The direct income in water-rate and miscellaneous receipts from productive works in 1925-26 amounted to 4.30 crores, and the expenditure on maintenance and interest charges to 2.34 crores, thus showing a profit of 8.5 per cent. But in addition there were large indirect receipts in the form of enhanced revenue from the irrigated lands. These indirect receipts were about 2.02 crores, bringing the profits after paying interest charges up to 17.2 per cent.

It should be noticed, however, that the capital outlay per acre irrigated has risen greatly. In the case of four of the older perennial canals, the capital outlay per acre irrigated in 1924-25 was Rs.19, while on four new perennial canals it reached Rs.43. In the case of the Sutlej canals now being constructed, the capital cost per acre irrigated is likely to exceed Rs.80; and other projects under consideration would involve a capital expenditure of Rs.100 per acre irrigated.

The charges made for water are on an acreage basis and the rates vary with the kind of the crop. Remissions are given on account of failure. Typical charges in 1924-25 were for sugarcane Rs.12 per acre, for cotton Rs.6-4, for wheat Rs.5-4, and for fodder crops it has recently been reduced from Rs.3 to Rs.1-8 per acre. Proposals for supplying water on a volumetric instead of on an acreage basis have been considered, but for reasons that will be indicated below the Irrigation Department has hitherto found it to be impracticable in general to change its present method of charging by the acre irrigated.

The chief canals from which water is now being supplied may be briefly referred to.

The Western Jumna Canal is the oldest in the Punjab. It was originally constructed, as already noted, by Firoz Shah in the fourteenth century. The ancient canal was restored by the British between 1817 and 1847, and was further improved and extended between 1873 and 1880. The present canal takes off from the Jumna at Tajewala, commands about 2,700,000 acres

of land in the districts of Ambala, Karnal, Hissar, Rohtak and Delhi, and in the States of Patiala and Jind; but the water available allows only of the irrigation of about one-third of this area in a year. The full capacity is 6,400 cusecs, and this quantity may be available between the 10th of May and the 15th of September. In December the supply may fall to no more than 1,800 cusecs.

Upper Bari Doab Canal.—For political reasons this canal was projected immediately after the annexation of the Punjab. It waters the Doab between the rivers Ravi and Beas in the heart of the Sikh country. It takes off from the Ravi at Madhopur in Gurdaspur district. When full, as it usually is from the 15th March to the 15th December, it carries 6,700 cusecs, but in the later winter months the supply may drop to 1,500 cusecs. It commands some 1,600,000 acres, of which about 80 per cent. may come under irrigation in a year. Rice is an important crop in the area watered by this canal.

Sirhind Canal.—This canal, which takes off from the Sutlej at Rupar in Ambala district, was begun in 1869 and completed by 1883. It commands about 2,450,000 acres in the districts of Ludhiana and Ferozepore and can irrigate about 1,000,000 acres annually. The capacity is 5,600 cusecs, and from May to 15th August there is a full supply of water. This canal also irrigates land in the Indian States of Patiala and Jind.

The *Lower Chenab Canal.*—This canal was opened in July 1887, but its capacity was greatly increased when the Upper Jhelum was completed in 1915. It now has a capacity of 10,900 cusecs, and irrigates more land than any other. It commands 3,390,000 acres in the districts of Gujranwala, Lyallpur and Jhang, and can irrigate about 2,000,000 acres annually. The months of April and October are critical periods in the Chenab canals, and consideration is being given to a scheme for increasing the existing capacity of the Upper Jhelum Canal, so that more of the surplus water of the Jhelum than is at present possible may be diverted into the Chenab.

The *Lower Jhelum* canal, the first of the snow fed canals, with a capacity of 4,300 cusecs, was opened in 1901, it commands some 1,300,000 acres in the districts of Shahpur and Jhang, and can irrigate about 825,000 acres annually. A full supply of water is available from February until the end of November.

The rapid increase in canal irrigation in the present century is accounted for mainly by the construction of the linked triple canal scheme which waters the central plains of the Punjab. The following figures show the importance of these canals, which were opened between 1912 and 1915.

The *Upper Jhelum* has a capacity of 8,500 cusecs. It commands 600,000 and irrigates about 300,000 acres in the district of Gujrat; the full capacity of the canal can be used from about the middle of February to the end of November. The main

purpose of the Upper Jhelum Canal is to convey surplus water from the Jhelum river to augment by 6,000 cusecs the supplies required by the Lower Chenab Canal.

The *Upper Chenab Canal.*—This great waterway, with a capacity of 14,400 cusecs, has a double function. It commands some 1,600,000 and irrigates 650,000 acres in the districts of Sialkot, Gujranwala and Lyallpur, and it passes on 7,500 cusecs into the Lower Bari Doab Canal, which, in turn, commands 1,750,000 acres and irrigates about 1,000,000 acres in the districts of Montgomery and Multan.

Three groups of projects are now engaging the attention of Punjab irrigation engineers. There are, as has already been stated, many inundation canals, some ancient, others modern, in the Punjab. One important series depends on the waters of the Sutlej, and the uncertainty of the supply, together with the need for irrigation in new tracts of country, has led to the great Sutlej Valley Irrigation Scheme now in process of construction. Some of the new Sutlej canals have already been opened, and it is anticipated that the whole new system, commanding some 6,000,000 and irrigating 3,640,000 acres annually, will be in operation in 1932-33. A large part of the area to be irrigated (about 2,450,000 acres) will lie within the Indian States of Bikaner and Bahawalpur, which are bearing a proportionate share of the cost. The original estimate of the cost was about 14.6 crores of rupees, but it is now certain that this estimate will be largely exceeded, and a final cost of from 23 to 24 crores is anticipated, of which the Punjab Government's share may amount to about 10 crores.

Several minor schemes for improving the supply from inundation canals are also in progress.

The second type of project receiving consideration, one which demands attention not only in the Punjab but throughout India, is that of water storage. Periods of water scarcity occur on most of the canals, and it is natural that much thought should have been given to storing a part of the water that at certain seasons of the year in vast quantities escapes through flooded rivers to the sea.

When the Sutlej Valley canals have been completed all the winter water supply of the Punjab tributaries of the Indus will be used in irrigation, but only about one-third of the monsoon supply. It is estimated that one-third of the monsoon flood waters must in any case be allowed to escape so as to scour the river channels; but if it were practicable to construct reservoirs, the remaining third might be made available for irrigation. The difficulties presented by storage are formidable. Five schemes have already been investigated, but for one reason or another have not yet been taken in hand. It is confidently believed, however, that the difficulties which the construction of dams

now present will ultimately be solved and that ultimately large additional supplies of water will be available for irrigation.

The most important of these storage projects relates to a dam across the Sutlej at Bhakra, where the river passes through a gorge some 40 miles above Rupar. This dam would be 410 feet high and would impound no less than twelve per cent of all the water which it is calculated might be stored in Punjab reservoirs. After allowing for losses in the canals, it would deliver some 5,500 cusecs of water for 210 days in the year as an addition to the natural flow of about 5,000 cusecs taken from the Sutlej at this point. The water would be used to supplement the flow of the existing Sirhind and Western Jumna canals, and to fill a new Lower Sirhind canal, irrigating *inter alia* the insecure tracts of Hissar district. The entire area irrigated would be about 2,300,000 acres. The immediate obstacle to progress with the construction of the Bhakra Dam is doubt as to the foundations. Geologists have twice examined the underlying strata, differences in opinion have arisen, and a further examination of the site is now being arranged for. An estimate of the cost of the dam and canals was made in 1920, which amounted to 14.4 crores; but revised figures place the cost of the scheme, if carried out before 1937, at about 23 crores of rupees.

The third group of problems now engaging attention relates to the conservation and more effective use of the water at present available. Experience shows that much may be done in this way. If the areas irrigated by canals existing in 1900 be compared with the areas now being supplied, it will be found that although no extra water enters, there has been an increase of about 36 per cent in the area actually benefiting by canal water. Both agricultural and engineering questions are raised in connection with the distribution of water. There are differences of opinion as to the amount of water that crops require, and as to the methods of charging for the water provided. In general, it may be stated that agriculturists are disposed to claim that better results would be got if water were sold by volume and the cultivator left to do what he liked with the supply he received; but engineers argue that not only does the acreage basis afford the only practicable method of charging for water supplied to ordinary cultivators, but that it is the better method for the small cultivator himself. It is agreed that the owner of a large estate, who purchased by volume, would derive advantage from having the distribution of his supply entirely within his own control, and, in fact, a few large owners are now supplied by volume, but it is stated by the Irrigation Department that the advantages claimed for the small man are illusory. The main advantage claimed by advocates of the volumetric system is that it would free the cultivator from the too common exactions of petty officials, who record the area of land he irrigates; but canal engineers

point out that in any case there must be petty officials, that gauge-readers would be no less troublesome than the *patwaris* who now record irrigated areas, and that since it would be necessary to sell by volume as small a quantity as 2 cusecs of water, irrigating less than 1,000 acres, the number of petty officials with whom the cultivator had to deal would not be reduced. On other grounds, the Irrigation Department claim that a record of the area irrigated must in any case be retained, for exact information as to the areas supplied in different districts is necessary in designing canals; moreover, unless such records were kept there would be no sufficient check on tampering with the banks of water channels and illicit irrigation.

Much attention has been given in the past ten years to the equitable distribution of water, both at the heads of distributaries and at the outlets to the land of cultivators, with the result that economy in distribution has been effected, and, as noted above, the area irrigated from canals is gradually being increased. New water modules have been designed, and it has recently (1926) been decided that every reach of every distributary channel is to be fitted with meters of an approved type. Incidentally, these meters, by ensuring equitable distribution, will reduce the opportunities given to corrupt petty officials to extort money from cultivators requiring water.

In distributing water the canal officer is guided by the departmental rule that 88 acres of *kharif* crops and double this area of *rabi* crops should be irrigable for each cusec of water supplied from an outlet. (To allow for waste in channels, the main canal headwork supplies water at the rate of one cusec per 65, and the distributary headwork at the rate of one cusec per 80 acres.) A further rule lays it down that not more than three-fourths of the cultivated land commanded should be irrigated in a year. Assuming 1,000 acres of cultivated land to be in question, irrigation of 750 acres would be permissible, the area to be supplied in the *kharif* season would be 250 acres, and for this area it would be necessary to provide at the outlet for the delivery of $\frac{250}{88} = 2.84$ cusecs of water. This quantity would subsequently supply the requirements of 500 acres of *rabi* crop and it is all that would be provided for cultivators. It is admitted that this allowance is a small one in comparison with what the cultivator would like, but it is contended that when the water is skilfully used cultivators are able to irrigate substantially more land than the rules assume; and, as water is scarce, that economy must be practised, if the full benefit of the canals is to be secured by cultivators within the commanded areas.

Reference has already been made to the possibility of conserving the monsoon waters of large rivers by constructing reservoirs. In districts having a moderate rainfall small reservoirs have long been a feature in rural economy. They are formed by small earthen embankments or *bunds*, constructed

in *nullahs* (deep, and during the greater part of the year dry, channels of streams). In the Punjab itself, except in the district of Gurgaon, these *bunds* are of little importance, but elsewhere, for example in Jaipur State adjoining Gurgaon, a large amount of *rabi* irrigation is carried on from embanked *nullahs*. Gurgaon *bunds* were formerly in charge of the District Board, but, as they were being neglected, their management was transferred in 1923 to the Drainage Board (now the Rural Sanitary Board) and 35 *bunds* distributed over four tahsils of the district have recently been repaired.

Bunds contribute to rural welfare in several ways. Originally many of them were constructed to impound monsoon water, in order to soak the subsoil and so permit of the growing of crops in the *nullah* beds above the *bunds* when the surface dried. The *nullah* bed is not only soaked, but its surface is enriched by the deposition of silt. Other *bunds* have been constructed primarily with the object of checking erosion; and others have formed large tanks or shallow lakes for the irrigation of *rabi* crops. While, relatively to canals and wells, these *bunds* are of small importance in the Punjab (when the Gurgaon *bunds* were taken over by the Drainage Board it was ascertained that the average area benefited in the preceding fourteen years was 5,779 acres) it is satisfactory to find that their development is now being studied by engineers of the Irrigation Department.

In certain of the canal areas the seepage of water from channels and the too free use of water by cultivators has resulted in a rise of the level of subsoil water to a degree that endangers not only crops but the public health. As compared with the area irrigated the actual extent of waterlogged land is quite small, some 80,000 acres in all in the canal areas, and of this total two-thirds only have been seriously damaged; but in view of the enormous volume of water now spread annually over the soils of the Punjab, and of the cumulative effect to be anticipated in areas where the subsoil is not naturally well-drained, the whole subject of waterlogging is receiving close and continuous attention. Drainage schemes for the relief of waterlogged areas were formerly in charge of the Irrigation Department, but in 1923 a special Drainage Board (now the Rural Sanitary Board) was set up to carry out drainage schemes, and a committee has been charged with the duty of studying the conditions which make for waterlogging. The Irrigation Department are endeavouring to reduce the seepage from canals, and experiments have been made in lining the canals in districts where the soil is specially porous. After thirty years of experimental work, in which various materials, from oiled paper to cement concrete, have been tried as canal linings, the only really satisfactory lining is found to be cement and sand mortar of not less than $1\frac{1}{2}$ inches in thickness, and the cost of this form of lining makes its general use prohibitive. Well-designed drainage works offer the best prospect of preventing waterlogging, and success has already been met with on the Western

Jumna, Upper Jhelum and other canals. Open drains are mainly relied on, but mole drains and tile drains are being experimented with in saturated fields. In at least one area, Amritsar, pumping from deep tube wells has been successful in lowering the water-table and improving the sanitary conditions of the city and its surroundings, although at a cost that would not have been warranted if agricultural improvement had been the sole objective. When drainage is not available, an effort to control waterlogging in threatened areas is made by suspending irrigation during the *rabi* season.

Apart from the well-known ill-effects produced on most crops by a saturated surface soil, there is in the Punjab a special danger to be apprehended from waterlogging. The deep alluvial soils are frequently charged with large quantities of sodium and magnesium salts; salt or *kalar* soils are common even where the water-table is deep, and when the surface soil, or the subsoil at a depth of a few feet, is saturated *kalar* is almost certain to give trouble. As in other parts of India, remedies have been sought, but the only practicable remedy so far discovered consists in washing out the salts from the surface by free irrigation, and this method to be successful implies equally free drainage.

Irrigation Research Committee.—An Irrigation Research Committee, consisting of a soil expert, specialising in soil chemistry and physics, and an engineer, was set up in 1925 to explore the problems now facing the Irrigation Department. A suitable laboratory has been planned and is being built, and a central field experimental station has been established. Three groups of problems will be investigated, *viz.*:—

1. Movements of the water-table in connection with waterlogging, or desiccation. Waterlogging difficulties have been referred to above; the converse problem, lowering of the water-table to an undesirable degree, owing to the increasing intensity of well irrigation, presents itself notably in the fertile tract round Jullundur. Data for study are available in spring level records kept for many years by the Irrigation Department; and, where no canals exist, from the less exact information collected by revenue officials. To supplement existing data, surveys will be undertaken. There is considerable evidence that the free flow of subsoil water is prevented by the occurrence of impervious strata buried beneath the alluvium. Rock masses might account for the waterlogging of tracts lying upstream and, if their existence were proved at no great depth, remedies for the waterlogging of large tracts might be possible. It is proposed to use the Etvös Torsion Balance in searching for such obstructions to drainage.

2. Hydro-dynamical problems present themselves in the designing of irrigation channels in connection with the movements of silt. The only method of studying these movements in detail is by means of models reproducing, under

controlled conditions, the flow of silt-charged water in channels. The new laboratory will provide a hydraulic installation which will enable silt and water movements to be studied in detail.

3. Field investigations relating to the reclamation of waterlogged land are projected. A site has been selected in a locality where much badly waterlogged land exists. Experiments have been planned on mole drainage and tile drainage, in conjunction with a system of open drains. Observations will be made on the behaviour of crops in soils with a high water-table, and, using these observations, crop experiments will be designed which will be conducted at suitable centres elsewhere in the province.

8. FORESTRY IN RELATION TO AGRICULTURE.

The Punjab is poorly supplied with timber; less than 10 per cent of the total area of the province is classed as forest land, and in British territory, under direct charge of the Forest Department, there are only some 4.3 million acres, of which 2.7 million are in the hills and 1.6 million in the plains. The land under forests is mostly open for grazing and grass-cutting, and forms a reserve for fodder supply invaluable in time of scarcity. From 280,000 acres only are stock entirely excluded, but on a further 220,000 acres the grazing period is limited. Thus 3.8 million acres of the land now classed as forest may be regarded as an addition to the area available to the agriculturist. The value of the grazing rights is assessed at over Rs.20 lakhs per annum by the Forest Department. In other directions forests confer direct benefits on the Punjab cultivator. It is estimated that he annually receives 25 million cubic feet of firewood, and a million cubic feet of timber free of charge.

In spite of these benefits, the cultivator, especially in the hill districts, regards the work of the forest officer with disfavour, and the forest officer has too good cause to complain of the destruction done in the areas under his charge, by overgrazing and the careless felling or lopping of trees by villagers. Forest destruction has resulted in widespread erosion of hillsides in the Siwalik hills, and excessive browsing by goats has greatly reduced the value of the land in other hill tracts. It is of special importance in view of the extension of irrigation on the plains that the rainwater of the hills should sink into the soil and not disappear in torrential floods into the rivers, as it does where hill forests are destroyed; and no less for the sake of the welfare of the cultivator of the plains, than for the value of the trees in their charge, forest officers are doing what they can, in spite of local opposition, to conserve and re-establish trees in threatened forest areas. It is from the Forest Department more than any other that complaints

are heard of the over-stocking of grass-land with animals of no economic value, for this is a subject that is constantly being forced upon their notice in the extensive grazing areas which they control.

For the needs of the people, forests in the hill districts are relatively ample. It is in the plains that the great scarcity of timber and fuel reserves is apparent. As irrigation has spread, some 2 million acres of waste land, formerly classed as forest, have been taken up for cultivation, and a further 650,000 acres will shortly be irrigable and used for field crops.

As compensation some 85,000 acres have been, or shortly will be, covered with irrigated plantations, in which the production of firewood and timber will be rapid; but on so small an area even tropical growth must leave the Punjab plains very poorly provided for. It is certain that if the people are induced (indeed before they can be induced) to substitute wood for cowdung as fuel, much larger areas must be set aside for plantations.

In addition to the forests under the Forest Department, there are in the Punjab considerable areas of forests and waste land which come under the Revenue Department and are in charge of the deputy commissioners. The fees received for grazings in 1924-25 amounted to Rs.62,000 and in 1925-26 Rs.66,000. Some forest land is also under Military control. The total area of the forests and waste land under Revenue and Military management in 1925 was 515,000 acres; most of it is of little account as a source of timber or fuel, but about 320,000 acres is classed as " reserved " forest.

9. GENERAL EDUCATION.

" It is suggested that the solution of the problem of rural education is the foundation of all rural progress. The agriculturist is of more importance than agriculture." These words, quoted from the memorandum prepared for the Commission by the Punjab Government, may be taken to show the attitude which the Education Department of the Province adopt to agriculture. They are well aware of the importance of the agriculturist in the community which they serve, of the value of education to him, and of the need for an educational system which will meet his special needs. In recent years close and continuous attention has been given to the problems presented by the illiterate peasant population. Before describing what has been done to promote education in rural areas, a few facts about the educational system as a whole may be given.

The total expenditure on education at recognised institutions in the Punjab in 1925-26 was 256 lakhs of rupees, as compared with 190 lakhs in 1920-21 and 60 lakhs in 1911-12. Of the 1925-26 expenditure, fifty-two per cent was contributed by Government, thirteen per cent came from the funds of district

and municipal boards, twenty per cent from fees and fifteen per cent from other sources. The cost per enrolled scholar was Rs.26-4-3. The average cost per pupil at different types of institutions is stated in the table of figures given below.

In 1921 there was in the Punjab a population of some 11,300,000 males and 9,380,000 females. Of the former 954,000 or 8.44 per cent and of the latter 108,000 or 1.15 per cent were under instruction in 1926.

Of the male pupils about 900,000 or 7.96 per cent were attending institutions recognised by the Education Department. In the following table are given particulars of the institutions, scholars in attendance, and cost per head of each pupil :—

Kind and number of institutions.	Number of pupils.	Percentage at each institution.	Cost per pupil.
			Rs. a. p.
1 University	—	—	—
21 Arts Colleges	7,383	·82	194 6 0
7 Professional Colleges	1,729	·19	616 7 2
285 High Schools	111,126	12·35	44 5 5
1942 Middle Schools...	311,218	34·57	13 6 10
5714 Primary Schools	377,315	41·91	8 10 10
3268 Special Schools...	91,386	10·15	10 7 4

The University of the Punjab, Lahore, is at present mainly an examining body. The arts colleges, which prepare students for university examinations, include a new group of seven intermediate colleges, designed to bridge the period between high school and university studies. Largely in the interests of the rural population these colleges have been started at suitable centres so that young boys may not have to leave their own districts for study in the large towns. Two high schools and two college intermediate classes are included in the curricula of the new colleges. Not only do the ablest among country boys thus get an opportunity of preparing for university examinations, but their fellow students, who do not attempt to graduate, get a better education near their own homes than was formerly available. Again, with the object of improving education in country districts new high schools have recently been provided, mainly for outlying districts. A survey of the position of Anglo-vernacular education made some three years ago showed that the richer urban and thickly-populated areas were amply provided for, but that in backward rural areas facilities were " painfully few and far between." By economies effected in expenditure on schools in urban areas, money was provided for extra grants for secondary education in rural districts. In thinly-populated tracts the district boards were found to be unable to support a high school, and at the same time do justice to other forms of

education; in such cases the Education Department provided new high schools supported by provincial funds.

It is not, however, in the high schools and colleges that the interests of the rural population mainly centre. Of far greater importance to Punjab agriculturists are the primary and vernacular middle schools, and it is recognised that, in the past, for reasons which, if not adequate, are easily explained, too much effort has been concentrated on providing higher education for the few, and too little in promoting literacy in their own mother tongues for the people of the province. A determined effort to repair the error dominates the present educational policy of the Punjab.

It will be seen that there were in 1925-26 about 688,000 pupils, or seventy-six per cent of the total number, attending primary and middle schools. The increase in enrolment has been rapid, for in 1920-21 the pupils numbered only some 415,000. The above table requires explanation, for it would appear that the number of middle school pupils is not far short of the number at the primary schools. These unexpected figures are accounted for by the fact that many middle schools have primary classes, and the pupils (about three-fourths of the whole) attending such classes are shown as being in attendance at middle schools.

If one were to judge by the rate of increase in the enrolment of pupils in the last five years, it would appear that in five more years some eighty per cent of the boys of school-going age in the province might be attending school. Unfortunately, from this rapid increase in school attendance it cannot be assumed that after ten years or so the percentage of literate males in the Punjab would rise from 14, the present figure, to somewhere about 75, for by far the larger number of pupils who enrol in class I never become literate. Less than one-quarter of the boys who now enter class I continue at school until they have passed through class IV. Not all who pass through class IV remain literate, and very few of those who do not enter it can be expected to be able to read and write in later years.

Literacy in the masses, and not merely increased school attendance, is the aim which the Education Department has in view. In the furtherance of this object, attention is being concentrated on the training of teachers, the school curriculum, the formation of branch schools, the opening of vernacular middle schools in rural areas, the introduction of compulsory school attendance and the provision of schools for adults.

The teacher is the crux. It is recognised that for country schools teachers must be found "possessing sympathy and understanding of the village people." The most urgent need of the village is "a headmaster who will transform the village school into a village institution, will be respected by the village people and will be 'passing rich on £40 a year'" or on its

equivalent of Rs. 50 per mensem, which is what the Punjabi headmaster may expect to earn. Teachers' training institutions were outside the ambit of most village teachers; the device has, therefore, been adopted of attaching training units (a unit is a class of 40 students) to high schools and other suitable local institutions throughout the province. Of these units there are now 46 for junior and 12 for senior vernacular teachers. Ten years ago the numbers of teachers undergoing training were 796 and 82 respectively; they are now 1,840 and 480. Since the training centres are widely distributed, it is possible to secure many teachers from the agricultural classes. In recent years from 40 to 50 per cent of those under training were drawn from agricultural tribes, and not a few others had been brought up in rural surroundings.

In 1923 a special committee considered and reported on the curricula of vernacular schools. Their main conclusions were (1) that in primary schools "the subject matter taught and the methods of instruction pursued should be such as to bring the work . . . . . into the closest relation to the life and experience of the pupils . . . . the acquisition of suitable knowledge and the attainment of literacy should be the main objects of the course; (2) in regard to middle schools, the central subject of study should be that of rural science, which should co-ordinate and vitalise many subjects already included in the curriculum." When this report was received, it appeared to be desirable that new courses should at once be framed, and suitable text-books prepared, but consideration showed that until teachers could be trained to interpret rural science to their pupils in the spirit and manner recommended by the committee, no substantial advance was possible. For the moment, therefore, there has been concentration on the teacher; in the meantime, by the establishment of new primary schools, by concentrating, where this is practicable, the teaching of classes I and II in branch schools, and by an important experiment in middle schools to which reference will presently be made, preparation is being made for the introduction of new and more educative courses in the rural schools of the Punjab.

This new policy will involve a very considerable increase in expenditure, and it is evident that if literacy cannot be secured, the expenditure must be wasteful. In the view of the educational authorities, the most effective way of avoiding waste would be compulsory school attendance up to at least the completion of class IV. But it is doubtful whether the province as a whole is yet ready for compulsory attendance. Without the backing of the community, especially of the parents, no Act decreeing compulsion could be enforced. The Education Department, therefore, place reliance on what they term "voluntary compulsion." The community must be educated to the point at which they will apply for compulsory education under an existing Act, and then it will be (as it already is in

a number of both urban and rural areas) a practicable measure to enforce compulsory attendance. The success of this policy may be gauged by the fact that in 1927, 1,600 rural areas had introduced compulsory education up to class IV. Moreover, the movement is widespread, for in 20 out of the 29 districts of the Punjab, at least one, and often many local bodies, had at that time voluntarily adopted compulsion. A specially interesting feature of the movement is that sometimes these local bodies take the form of co-operative societies of parents, who agree to send their children regularly to school; penalties against defaulters are in these cases imposed not by the courts but by the co-operative society.

Similar evidence of the public spirit which the co-operative movement has evoked in the Punjab is afforded by the adult schools, which are mainly, it is reported, the outcome of that enthusiasm for self-help which this movement has engendered. In March, 1926, there were 3,208 of such schools attended by nearly 85,400 adults.

Literacy, though acquired, is too often lost by the schoolboy, and the adult is exposed to a similar danger; as a counter to this evil village libraries are being provided. Following a lead recently given by Britain, the Education Department has set up a Rural Community Board, and district community councils, to supervise village library, adult school, local popular lectures and other general " uplift " movements. Where there has been concentration on the work of village uplift, astonishing progress has been made, as will be seen by the evidence given on the Gurgaon district.

From the agricultural point of view the chief interest in the educational position of the Punjab centres in the experiment now being made in teaching agriculture in middle vernacular schools. The growth of the middle vernacular school is one of the best tests of progress which can be applied to rural education, and it may be noted that since 1921 the number of lower middle schools, teaching only in the vernacular, has risen from 400 to over 1,340. It is recognised that the best chance of educating the most intelligent among those sons of the zamindar who will certainly return to the land is to be found in such schools; for once the boy learns English, there is a danger (and the abler he is the greater the danger) that he will seek his fortune in towns. It was decided, therefore, in 1919 to initiate an experiment in the teaching of agriculture in the middle vernacular schools. This experiment has now been working for seven years; the Punjab Education Department believe that it is on the right lines, and the methods employed are now being carefully studied by other Indian provinces; it will, therefore, be desirable to give some details. The reasons for the experiment, and the methods employed are given in a memorandum

issued by the Education Department in September, 1923; they are as follows :—

(i) It was decided to include, and to provide for, teaching in agriculture in the ordinary vernacular schools rather than to start separate agricultural schools of a special type. There are many cogent reasons in support of this decision. In the first place, separate agricultural schools are very expensive. In the second place, specialised training for boys below the age of seventeen is premature. And, above all, a sound and suitable measure of general education should be the basis of all specialised and vocational training. The aim of the Punjab Government is therefore to enrich the middle school course in rural areas by the inclusion of agricultural training and thus to bring it more in keeping with the environment of the pupils; and the object is to use agriculture as a means of mental discipline and training and as an important accessory to the general subjects taught in those schools.

(ii) The training is of a practical as well as of a theoretical nature. For the fulfilment of this object, farms of about three acres each are attached to those schools, in which this form of training is imparted. In 1923, owing to the financial stringency which then prevailed, an alternative was adopted in the form of miniature farms or school gardens. With the exception of a *beldar*, who looks after the bullocks, all the work of the farms is done by the boys.

(iii) The teaching is in the hands of trained and carefully selected teachers who have first taken the ordinary senior vernacular training course and have then completed a special course in agriculture at the Agricultural College, Lyallpur. By this means the necessary co-operation between the departments of Agriculture and Education is promoted.

In 1926 the experiment was in progress in 66 schools, 27 of which had farms, and 38 gardens; and in the same year 32 teachers, holding the Senior Vernacular Teaching Certificate, were undergoing training at Lyallpur, so that the number of middle schools with agricultural classes will soon reach 100. There is now no question that the experiment has been successful; but there is some division of opinion as to whether, apart from expense, a 3-acre farm or a ½-acre garden should be attached to the schools. Some of the senior members of the Agricultural Department fear lest the practical management of the school farm may not commend itself to the critical cultivator. On the other hand, it is pointed out that, assuming it to be properly managed, there is no question that the farm is educationally better than the garden; and that in fact some of these school farms are so well conducted that already cultivators are going to the agricultural teachers for advice, or to purchase seed of improved crops. Again, it is clear that the question of

farm versus garden is bound up with the capacity of the teacher. but it may be noted that the Education Department which, in this matter, is directly responsible, is well satisfied with the results hitherto secured, and is hopeful that not only will the school courses prove of direct educational value to the boys of middle vernacular schools, but that many of the school farms may become centres to which the parents will come for practical hints on the management of land. Those who have long realised how well the work of the cultivator is adapted to furnish a subject that may be turned to the educational benefit of the growing boy, will note with special interest the experience now being gained in the Punjab.

And it is not only in the middle vernacular schools that experience is accumulating. Stimulated by the example of American Presbyterian Missionaries, who in their experimental school at Moga have used agriculture and other industries as a means of quickening and training the intelligence of their pupils, the Education Department has started two centres, largely in imitation of Moga, for training teachers. One of these at Ghakkar was an ordinary training centre; its scope has been extended to include practical training in the " matters which should promote the well-being and progress of the Indian village." The other is a school of rural economy at Gurgaon, for senior teachers who already hold certificates. In the ordinary examination for teachers' certificates it has been found that the Ghakkar students showed the best results. The conclusion drawn is that " the fuller and wider training is not only good in itself, but that it also improves the efficiency of the ordinary training for the teaching profession in its limited sense. Steps are now being taken to extend this new form of training to all training institutions."

10. CO-OPERATION.

The total expenditure on Co-operation in 1925-26 was only Rs.6½ lakhs, but the guess may be hazarded that it is the work which the Co-operative Department has done for the Punjab that has suggested the title. If it has not, it may at least be claimed that " beneficent " well describes this department's activities.

There are now nearly 17,000 co-operative societies in the Punjab, and the number is increasing rapidly. It is estimated that 4 per cent of the male population are members of the co-operative societies. Most important are the 14,300 credit societies, and it will be necessary to deal with their organisation and character in some detail; but before coming to them it will be desirable to catalogue the other activities of the co-operative movement, so that an indication of its scope may be obtained.

Chief among these other activities, because of the size and difficulty of the problem to be solved, and because of the novelty

of the method of solution, is the work of societies for the consolidation of holdings. Fragmentation of the land into tiny and utterly uneconomic plots is an evil to be found in every Indian province, and it is common in several European countries. Hitherto, with one European exception all those authorities who have attempted to consolidate holdings, have done so by Statute and regulation. In the Punjab the plan of dealing with fragmentation through voluntary and co-operative methods was conceived. Co-operative societies for the purpose were established, and already, although the movement is quite new, about 98,000 acres in 314 villages have been consolidated and re-allotted with the consent of the owners and without resort to compulsion. Consolidation has not only much reduced the cost of tillage; it has enabled new wells to be sunk, and it has removed the cause of much quarrelling and litigation over boundaries. For, in spite of village maps, the boundaries of these innumerable small plots were difficult to define, and his neighbour's landmarks are not always sacrosanct in the eyes of the Punjab peasant. Other indirect results of consolidation show how important is its influence. For example, an owner who found himself with 200 acres in a single block enclosed the whole with a thorn edge—and the reporter adds, " if this practice were to spread, the consequences to agriculture might be momentous." Another result was a complaint that as a result of consolidation a cattle pound had ceased to be remunerative. Cattle-trespass, it should be explained, is a curse to the Indian cultivator; but fines add to the incomes of district boards.

The success of land consolidation in the Punjab is due to the fact that cultivators know compulsion will not be used against them. A committee is set up to re-allot the land, and it is not until each cultivator has seen and agreed to accept the new area assigned to him that the society is registered. Natural conditions in the Punjab also favour the work. In those districts in which progress has been most rapid the land of the village does not vary much in quality.

Cattle-breeding and sheep-breeding societies have already been alluded to. Of these societies there are now 181 with about 2,600 members. Livestock insurance societies were started, but they were not a success and have been closed; the premiums required to cover the risks were high, and greater than members were willing to continue paying.

Milk-recording societies were formed for the first time in 1926, and a special staff of recorders has been trained for carrying on the work required and promoting extensions. Progress is hindered by the superstition that milk-measuring is ill-omened; but when the societies increase beyond the present number of 23 it may be hoped that the fear of ill-luck will disappear.

Ninety-nine better farming societies are now at work; the members pledge themselves to follow methods recommended by the Agricultural Department. A member who farms badly may

be fined. Some of these societies hold agencies for seed and implements. A group of 26 societies with 432 members has been formed in the west of the province for the purpose of clearing the channels by which water is brought from inundation canals to their villages.

Five societies have been formed for cultivating land co-operatively, and the latest report is that they are "improving." But even in the co-operative atmosphere of the Punjab, co-operation for the tillage of land is beset with difficulty, and we read, "Quarrels have for the moment disappeared." The Assistant Registrar supervising them significantly remarks, "the members have realised their privileges rather than their responsibilities."

In every direction attempts have been made to organise agriculturists for better production, but success cannot yet be recorded in the case of fodder storage societies, poultry-breeding societies and one or two other efforts. Valuable experience is being gained of the purposes for which producers will, and will not, combine; but the co-operative movement in the Punjab has only just reached its majority (it started in 1905) and there is still hope the "will-nots" of to-day may become the "wills" of to-morrow.

Co-operation for sale has been begun. Thirteen commission shops were at work in 1925-26. Eight of these shops are in the Chenab Canal area, and in 1925-26 they sold produce to the value of Rs.21 lakhs. Of this form of co-operation the Punjab Administration Report, 1924-25, says: "Advocates of co-operation as the reliable panacea for all rural ills, write of co-operative sale of cultivators' produce as a simple, natural thing which has only to be mentioned to be adopted. In fact, few things are more difficult. In most countries, the middleman holds a strong position with well-established interests; and the Punjab is no exception." It is clear from this statement that the need for caution in developing effective sale societies in the Punjab exists, and is appreciated.

Co-operative purchase of seed, implements and other farming requisites, where this has been organised, is carried on through the credit societies and not by separate purchase societies. Such special purchase societies were formed during the War, to check profiteering; but after the War it was found to be undesirable to continue them.

Outside the ranks of agriculturists themselves, co-operation has been of use to village artisans. There are about 3,700 members belonging to 188 artisans' societies for assisting production, chiefly among hand-loom weavers and dyers. Rural artisans are eligible for membership of the ordinary village credit societies, and often take a leading part in their management.

Agriculturists, with other members of the village community, also form societies for such purposes as promoting thrift, for which there are 745 societies; or for compulsory education which gives work to 158 societies with 6,900 members.

Co-operative credit forms by far the most important feature of the co-operative movement, and its success in the Punjab requires that a description of the policy and methods that have led to results on so great a scale should be given.

In the section of this Introduction which dealt with the cultivator, reference was made to the huge volume of the Punjab zamindar's debt. Mr. Darling has estimated that in 1922 it amounted to some Rs.75 crores or £50,000,000, that the obligations of each debtor averaged Rs.463, that 83 per cent of all landowners were in debt, that tenants, like owners, were deeply involved and that the total agricultural debt of the province was about Rs.90 crores.

In 1905 when the co-operative movement began, agriculturists held *taccavi* advances of Rs.20 lakhs from Government under the Land Improvement Loans Act and the Agriculturists' Loans Act. On the average of the five-year period ending in 1924, such loans amounted to Rs.36.25 lakhs. These *taccavi* advances are made for productive purposes and they are specially useful in time of stress. In relation to the total volume of debt their sum is trivial. Outside the co-operative credit society, therefore, the cultivator has to look to private sources for the money he borrows. These sources are the village shopkeeper or *bania* who subsequently buys his produce and sells to him what he requires on lender's terms; the cattle dealer, from whom if he borrows he must accept the bullocks offered to him, on the vendor's terms; the commission agent who advances money on the growing crop, and is not always careful to pay market price on the crop when delivered; the goldsmith who makes advances on his jewellery; and his more prosperous neighbour agriculturist who takes a usufructory mortgage and so amply recoups his loan. It is impossible to say what the average rate of interest amounts to. It has been estimated, as already stated, at not less than twenty-five per cent. Looking to the general character of his creditors, it may not be unsafe to assume that once he has become deeply involved, the zamindar's creditor takes from him all he can give up. Thus the rate of interest will vary with the harvests; in a period of good years, the moneylender, not the producer, will reap the profits of bumper crops; in a series of bad years the return to the lender may not average more than twelve or fifteen per cent which he himself states to be his rate. There may not be an exact Urdu equivalent for the British maxim, but the Punjabi moneylender, in plucking it bare, is doubtless careful not to kill the goose that lays the golden egg.

It was primarily to deal with this evil, the stripping of a frugal, hard-working but simple and improvident peasantry of all its possessions, by rapacious moneylenders, that the Punjab adopted in 1904 the Co-operative Credit Societies Act. The new movement began in 1905 when a staff to foster it was created. This staff now consists of a Registrar who is a member of the

Indian Civil Service, assisted by two deputy registrars, and seventeen assistant registrars, all gazetted officers of the Provincial Service, one hundred and nine inspectors, fifteen sub-inspectors for artisans' societies, and eighty-five sub-inspectors for consolidation of holdings work.

Most of the sub-inspectors employed in the co-operative movement have matriculated, and all the inspectors (except some men promoted for meritorious work) are graduates. Preference is given to graduates in economics, and, so far as possible, all those employed in the co-operative movement are selected from among the rural community. In any case, all graduates selected are given one year's special training in the field and a three-months' course of study in rural economics before taking up the work of an inspector.

Above the inspectors come assistant registrars, each of whom will have 6 to 8 inspectors working under him, so that he may be dealing with from one to two thousand societies. The assistant registrars are appointed from among those inspectors who have had eight to ten years' experience. Finally, under the Registrar and in charge of all details of work, are two deputies, who divide the province between them. In time it is proposed to have a deputy registrar for each of the five divisions of the province, and also to extend the junior staff, so that each of the 29 districts may have an assistant-registrar and each of the 115 *tahsils* of the province an inspector.

These government officers are almost wholly employed in supervision and inspection, the policy of the department being that the business affairs of societies should be managed by themselves. The ruling body in the movement is the Punjab Co-operative Union, which conducts audits and carries on propaganda. It employs some 450 sub-inspectors. The union is managed by a committee set up by central co-operative banks and banking unions, and these in turn are controlled by the primary societies. The whole credit structure rests on a democratic basis. The broad, and broadening, base of the co-operative pyramid which has been built up in the Punjab is at present formed by some 14,300 societies; the apex is the Co-operative Union, while near-by, forming no integral part of the pyramid but essential to its setting, is the watchful Sphinx—the Registrar of Co-operative Societies.

The union's sub-inspector spends most of his time in auditing, but he must also help weak societies to improve their methods and he must never forget propaganda. There may be as many as six working in a *tahsil*, and each may have 50 societies to supervise. The government inspector may have as many as 300 societies in his area; he checks the work of sub-inspectors and organises new societies where these present special features.

At present there are, as already stated, some 14,300 primary credit societies in the Punjab. Their sphere is not, in all cases,

restricted to credit, but purchasing and other activities are limited. The membership of these societies is 407,500, and they are to be found in about 13,000 out of the 33,000 villages of the province. The capital employed in the credit societies is 11 crores, of which some 5 crores are in the hands of primary societies themselves. This sum includes Rs.68 lakhs in shares, over Rs.122 lakhs of reserves and undistributed profits, about Rs.48 lakhs in deposits, and Rs.2 crores borrowed from central banks.

Above the primary societies there are 116 central banks and banking unions whose funds are derived chiefly from the general public in the form of deposits. The resources of the central banks include Rs.46 lakhs share capital and reserve, Rs.37 lakhs deposited by primary societies and Rs.360 lakhs deposited by the public. The sums held from Government are small, less than Rs.5 lakhs.

In 1924 there was established a Provincial Co-operative Bank to function as a central bank for central banks. It is anticipated that it will take a leading place in co-operative finance. With the aid of a guarantee of interest for a term of years by Government, it is now issuing debentures in order that the mortgage banks referred to below may be assisted to increase their operations; debentures for Rs.5 lakhs have already been issued and subscribed by the public, and a total issue of Rs.20 lakhs is contemplated.

The primary credit society has an average membership of 26 persons, who may all belong to one tribe or caste; but as most villages contain one society only, a distinction of persons is discountenanced, and high-, low- or no-caste members are admitted. Essentially the primary society's success is bound up with the degree of mutual understanding and appreciation shown by its peasant members; just as its only outward and visible sign of existence " consists of a bundle of books tied up in a cloth," for the society has no office, nor telephone, nor telegraphic address. No stranger ignorant of the work that has been done for co-operation in the Punjab would suppose that this unadvertised village body was a unit in a big business; any more than, if ignorant of the canal system, he would connect some little rill of water in the neighbouring field with the Jhelum or Chenab 100 miles away. Those responsible for guiding co-operation in the Punjab have studied co-operative movements in many countries and have noted that too often they were swamped by over-much official management or over-much benevolent attention on the part of rural reformers. These errors they have avoided.

The books of the primary society are usually written up by an honorary secretary of little education, but he does his best, and the sub-inspector corrects the errors. If special difficulties occur an inspector may be called in. It is seldom that the affairs of these societies go far astray; and though the business is transacted by committees, few of whose members can read

or write, the rural population is gaining so much confidence in their work that everywhere there is a keen demand for the formation of new societies.

Primary credit societies differ widely in capacity and in the amount of attention which they require from the inspecting staff. They are classified into four groups. Group A, which, in 1925-26, included 4.25 per cent of the total, consists of those thoroughly competent societies which require no assistance from either the department's or the co-operative union's staff. Their accounts are audited, otherwise they are left to themselves. In class B come 26.25 per cent of the societies. These must be qualified to keep their own accounts, collect dues owing, prepare crop-demands, loan applications and arbitration references, and they must be able to enforce awards against defaulters. They may look to the inspecting staff only for advice and assistance of a general kind. When societies require help from the inspecting staff in the preparation of accounts, or for any of the business mentioned above, they are placed in class C. This is the most numerous type, accounting for 62 per cent of the total. In class D are placed the weakest societies requiring close attention by the inspecting staff; 7.5 per cent were so classed in 1925-26. So far 9,506 of the societies have been classified as above, the others await classification.

In order to ascertain the purposes for which the societies grant loans each sub-inspector analyses the loans made by five societies under his charge. In 1925-26 the affairs of 1,200 societies were thus investigated. The total of the loans granted was found to be Rs.35 lakhs. These loans were then classified under no fewer than 23 headings. The most important items for which money was borrowed were: cattle, 20.5 per cent; debt repayment, 26.0; trade, 8.5; ceremonies, 7.0; building, 4.0, and land purchase, 9.5 per cent. The last item was unusually high in 1925-26 because of the auction of land on new canals; in the preceding five years it had averaged 3.75 per cent.

The assets of all credit societies in 1925-26 amounted to Rs.162.87 lakhs, made up of shares Rs.58.52, reserves Rs.87.49 and profits Rs.16.86 lakhs.

The loans made by primary societies are usually for short periods not exceeding three years; but they may be, and frequently are, renewed. Repayment in 1925-26 amounted to Rs.150.38 lakhs, or 33.5 per cent of the sum on loan at the beginning of the year; about three-fourths of this total consisted of repayment of principal.

Primary societies usually borrow from central banks, or banking unions, the funds which they require at 8 to 9 per cent interest, and lend out to members at 12½ per cent. Many societies have accumulated a reserve which allows them to lend at lower rates of interest; in a few cases as little as 6 per cent is charged, and 9 per cent is a not uncommon rate. The Muslim religion discourages the taking of interest, and to

meet the views of the majority some thirty Mussulman societies, having accumulated funds, now lend to members without charging interest.

A central bank usually has its offices in the headquarters town of a district and the deputy commissioner often acts as its president; but his participation in the affairs of the bank is seldom more than nominal. The bank is formed by individual shareholders or societies. It has affiliated to it a number of primary societies, not all of which need borrow from the banks; all of them however, have a share in the management. The individual shareholders and the representatives of affiliated societies, each exercising a single vote, elect directors at a General Meeting. It is usual to provide that for every 100 affiliated societies there should be at least one director representing societies on the board. The societies have now in all cases got a majority of votes at the General Meeting and in most cases on the Board of Directors; but since the individual shareholders, and the directors representing them, are frequently educated townsmen, they are able to exercise guidance and control to an extent out of proportion to their number. The directors appoint a secretary usually one of their own number and a lawyer. Under the secretary the larger banks employ a paid manager, but the usual salary, Rs.75, rising to Rs.150, suggests that no great degree of authority is delegated to him. The accounts of the larger banks are audited by professional accountants or trained auditors, the accounts of the smaller by the department's inspectors.

A banking union differs from a central bank in having no individual shareholders. Its membership consists of affiliated societies. These unions borrow from the public, from central banks, or from joint stock banks. They are of great educative value, affording to their members practical training in finance and banking and scope for useful work in supervising constituent societies.

The central banks and unions pay interest on deposits, the rates generally varying from 5 to 7½ per cent with the term for which the deposit is made. They lend to one another at from 7 to 7½ per cent, and to primary societies at 8-9 per cent. Central banks may pay dividends up to 10 per cent; 8 to 9 per cent is a frequent rate. They must, like primary societies, carry 25 per cent of the profits to reserve. Banking unions pay no dividends. The reserves of central banks and unions in 1925-26 amounted to about Rs.15 lakhs. These reserves are not deposited in a single regional bank as is sometimes done elsewhere, but are held by the institutions themselves, and invested. The investments are lodged with the Imperial Bank of India. A certain amount of fluid reserve is prescribed and must be maintained. While the Co-operative Department, through the inspectors, is careful to see that the bye-laws are observed, nothing is done which is likely to weaken the sense of responsibility of the bank's directors.

Reference has been made above to the large amount of Punjab land which has been mortgaged. Much has been mortgaged beyond hope of redemption; but there is still much that a thrifty owner may hope to redeem. A controlled mortgage system based on reasonable rates may be, moreover, of the greatest value to the agriculturist, whether he be a large landowner or a peasant proprietor. The ordinary primary credit society is not intended to deal with mortgage business, which usually involves a loan for much more than the three-year period which primary societies take as their limit. For this reason, land mortgage banks have recently been started in the Punjab. There was no prospect of achieving progress by copying the very successful *Landschaften* of Germany, which issue bonds on mortgaged property, that are freely bought and sold by the public. The monied classes would not have been attracted by such securities, and the Punjab had to gain experience for itself. The first mortgage banks in the province were created to serve a district, and their funds came mainly from government loans granted through the Registrar. Experience has suggested that the district is too large an area to enable adequate supervision to be given, and after four district banks had been at work for a year or two, five new banks serving smaller areas, usually a tahsil, were founded. The first four banks were of the unlimited liability type, the others have adopted limited liability. To obtain an advance from one of them, a borrower, if there is a credit society in his locality, must belong to it, and must gain its support and guarantee for his loan up to a maximum of Rs.1,000. In other cases the mortgage banks satisfy themselves by accepting the security of the applicant's land, supplemented, if need be, by that of guarantors. As the newer banks work within a small area, the directors, who value the land, and may grant a loan up to fifteen times the value of the estimated annual net profits, keep in close touch with the borrower's affairs and the management of his holding. The usual rate of interest is nine per cent. The loans are granted for short periods. In contrast to European banks, where the period of loan may be 30-40 years, and repayment of principal is secured by a sinking fund, the Punjab banks grant loans for short terms, usually not more than fifteen years (in no case can they exceed twenty years) and repayment of principal is required in uniform periodical instalments. The 20-year period is governed by the terms of the Punjab Alienation of Land Act. For under the provisions of this Act a co-operative mortgage bank is not an " agriculturist "; it cannot, therefore, sell the land of a mortgagor, it can only take the annual income, and for a period not exceeding twenty years.

The first banks, being experimental in character, were chiefly dependent on government loans; experience now having been gained and successful working secured, the banks must look to the co-operative movement for funds, and in the second stage of

their work money is being found, as already stated, by debentures, which are being issued by the Provincial Co-operative Bank, aided by a government guarantee of interest. The conditions in the Punjab, and the position and experience gained by the eleven mortgage banks now working, suggest that this form of co-operative activity will develop rapidly. The volume of business as compared with that of the credit societies is, however, quite small at present. The working capital amounts to about Rs.13.5 lakhs, of which Rs.1 lakh consists of share money, and profits (no dividends are paid) and up to June, 1927, 16,000 acres of land, on which mortgages were held by moneylenders, had been redeemed by shareholders in the co-operative mortgage banks. Mortgage banks may, and do, assist other objects than the redemption of land in the hands of moneylenders. Members mortgage their land in order to effect agricultural improvements and they may also mortgage in order to pay off debt of a general kind.

11. COMMUNICATIONS AND MARKETING.

The rapid increase in the agricultural output of the Punjab in the past half century has out-run the progress made by its communications. A new programme of road development, which will be referred to later, was adopted in 1924, and recently there has been much discussion of tramways, motor transport and light railways as feeders to the main railway lines.

The province is served by the North Western Railway Company, which has some 6,300 miles of railroad under its charge between the Khyber Pass in the north and Karachi in the south. By far the greater part of the mileage is in the Punjab; and an examination of the map shows that fertile parts of the province are well served with railway lines. They traverse the plains, roughly, in a N.E.-S.W. direction at intervals of 20-40 miles in the canal colony area. Crossing these lines is the main line running N.W.-S.E. between Peshawar and Delhi through Lahore, with, to the east of it, a network of lines connecting up all important towns. In the west there is a line branching from the Peshawar-Delhi line near Rawalpindi in the north, traversing the Indus Valley to Muzaffargarh in the south and joining up with the other lines leading to Karachi near Bahawalpur.

The railway system is being extended on a programme which contemplates an addition of some 300 miles annually in the next five years. The present extensions are being constructed mainly in the interests of agriculture. The management of railways has not been transferred and rests with the Government of India; but in accordance with a policy adopted in 1924, a province may have the lines it desires if it is prepared to guarantee the Central Government against loss. Should the line be one, which, in the view of the Imperial Railway Board, is likely to be profitable, no guarantee is exacted. At the present time two lines, one of

5 feet 6 inches gauge and one of 2 feet 6 inches, are being constructed under a guarantee, and one 5-foot 6-inch line is being made without a guarantee.

There has been much discussion on the advisability of feeder tramways not under railway management. Advocates claim for these that they would be cheaper than roads, and that local management would ensure attention to local needs. On the other hand, it is pointed out that they would not admit of through booking, and that the charges which tramways would require to make in order to run at a profit would be likely to lead most cultivators to continue to do their own carting, so that little relief would be given to the roads. The present policy favours the construction of light feeder railways rather than tramways, but it is admitted that further experience may show tramways to be desirable for some districts.

Attention is also being given to motor transport. For passenger traffic the motor omnibus is spreading quickly, but for the conveyance of agricultural produce the motor van must await the development of metalled roads. For wheeled vehicles access to villages, except the few situated on the metalled roads, is barred by the condition of village lanes. The track or half-track vehicle is more likely to penetrate to villages than is the motor van, and experiments with it are desirable. It remains to be discovered whether in the present condition of village approaches, even the track vehicle could negotiate them with sufficient success to displace the indigenous means of transport.

There is much uncertainty as to the volume of the hired transport traffic in different parts of the province. It is known that in many districts hired carts and camels play a large part; but the cultivator does a great deal of carting to market, thus is it difficult to forecast the success of such alternative means of transport as motor traction or tramways.

There were in the Punjab in 1924 some 25,000 miles of road, excluding village lanes, but the condition of many of them was far from satisfactory, and in that year a new policy was framed. In the earlier years of the century the work of engineers on canals had far outstripped the work on roads; largely increased quantities of crops were being grown, and relatively little was being done to facilitate their movement to market. The Public Works Department, before 1924, had been responsible for some 1,800 miles of roads only, one-third of which—mainly in hill districts—were unmetalled. The remaining roads were in charge of district boards who had taken over responsibility for roads of different degrees of importance at various times. The chief roads in charge of the local authorities were those known as " Provincial Roads in charge of District Boards " and for these when taken over in 1911, earmarked grants for maintenance had been made. But these earmarked grants had gradually become merged in the general funds of the boards, and the pressure of other demands on local funds led to so much neglect of the roads

as to cause general complaints of their condition. The case for a new road policy was clear; a Communications Board was set up, and a new road programme drafted. This new programme has just been taken in hand, and its salient features may be indicated.

Punjab roads, as distinguished from village lanes, have now been grouped into three classes. Class 1 embraces arterial roads, and their construction and maintenance is entrusted to the Public Works Department. Excluding the Grand Trunk Road from Calcutta to the Khyber, which passes through the province, these arterial roads will mostly radiate from Lahore, will pass through all district headquarter towns and also traverse towns with a population exceeding 20,000. While maintaining the general arterial plan, branches will, where necessary, connect up important towns off the main routes. At present there are some 2,000 miles of metalled and 2,600 miles of unmetalled road in this class, and the policy is to metal all class 1 roads where heavy traffic makes this necessary. Because of the distance from which material must be brought, metalling is very expensive on the plains; the cost of annual upkeep is also high and may amount to Rs. 1,000—Rs.2,000 per mile. Class II, now known as "Main Roads," consist of roads of secondary importance maintained jointly from provincial and local revenues. They include roads passing through more than one district, or connecting up towns with 5,000 to 20,000 inhabitants. There are about 7,000 miles of such roads in the province, largely unmetalled. There remain some 13,000 miles of class III roads, almost wholly unmetalled, to be maintained by district boards out of their own funds.

At the present time, apart from the roads in the Nili Bar canal colony area, which are being financed out of the proceeds of land sales, the cost of roads to the Government is about Rs.35 lakhs for class I roads, and Rs.6 lakhs for grants-in-aid of class II roads. It is estimated, if the present programme is carried out, that in fifteen years time the expenditure on roads from provincial revenue will be Rs.80 lakhs and from district board funds Rs.30 lakhs.

This great programme of extension is yet in the future, and as will be seen it aims mainly at supplying the pressing needs of the fertile plains. At the present time the Punjab offers contrasts in means of transport as great as can be found in any part of India.

The hill regions, the canal irrigated plains of the centre and the waterless plains of the west are of widely different importance from the point of view of agricultural transport; but each of them has its own transport problems, and each its own method of meeting them.

A few roads are maintained by the Public Works Department in the mountainous north, but in most of this region the limited

amount of transport called for presents much difficulty. Timber is floated down the rivers, but for other traffic pack animals, or coolies, are chiefly employed, and so great is the need, that sheep travelling from low-lying pastures to the hills may be used to carry packets of salt, or other small parcels of goods, on their backs.

Over the greater part of the plains the country cart, drawn usually by bullocks, sometimes by buffaloes, is the chief means of transport from the village to the market town. The horse is more often seen on Punjab roads than in other provinces, but with rare exceptions his load is a human one; he is not called upon to pull ordinary agricultural produce to market. The bullock carts are strongly built, as they need to be, but from the point of view of the road engineer their design is destructive, and efforts are being made to introduce wheels of a less damaging type. The peasant himself is not concerned with the effect of wheels on roads, but with their capacity to hold together on village lanes; the cart is to him a treasured possession; now and again a substantial zamindar who would think long before spending Rs.40 on a new iron plough, may be found in possession of a cart with highly decorative brass mountings, which has cost him Rs.400. It is well, perhaps, that his æsthetic sense should be gratified by contemplation of his cart, for the village lanes along which he passes could gratify no one. Unlike the wide hedge-lined lanes to be seen in some parts of India, they are usually narrow tracks, so narrow that carts pass each other with difficulty, they have thus been described to the Commission in the Punjab Government's memorandum:

> "Years of wear and neglect have resulted in their becoming depressed below the surface of the surrounding fields, so that in irrigated lands they are perennially and in others periodically liable to inundation, when they are puddled by passing cattle and bullock carts into a dreadful morass, aggravated by the buffalo who in his frequent baths may soon wallow out a mud hole feet deep and yards across. The Communications Board has recently initiated a policy for the improvement of these lanes, but progress is slow. They appear to be 'no one's child,' no authority budgets for their maintenance, and even their ownership is in doubt."

In the arid western country on both sides of the Indus agricultural transport is reduced to a small problem by the fact that there is little produce to carry. Roads and lanes alike are almost non-existent away from towns and railway stations. The chief transport animal is the camel, and he takes the "desert's pathless way." Until quite recently the camel was indeed a most important means of transport throughout the Punjab plains, but the coming of the canals, with their great new areas of wheat and cotton has altered the position. The loads of wheat and cotton are greater than his numbers can

cope with, and though the camel's back may still be unbroken, the heavily watered country is breaking up his constitution. The camel is disappearing from the canal colonies; but he is still so much a characteristic beast of burden in the Punjab, that here alone in British India his claim to recognition is officially admitted. It may indeed be hoped that, in gaily caparisoned teams, he may long be seen trotting across the parade ground, or along the racecourse, of Lahore, and that on great occasions, a camel carriage may remain an appropriate means of transport for Governors of the Punjab.

In an inquiry made into the cost of rural transport in the canal colony area in 1923, it was found that the camel was then still the cheapest means of moving wheat and cotton to market. The customary rates per maund per mile were found to be : for carting wheat long leads up to 20 miles, 3 pies, and cotton, 4 pies; for camel transport, wheat, 2 pies, cotton, 3 pies. Carting causes less trouble in loading and there is less risk of damage than in camel transport; thus, apart from the difficulty of securing enough camels, carting was found to be favoured in the majority of districts.

It will be seen that where the cultivator resorts to hired transport the cost is heavy. For a distance of 10 to 12 miles he may have to pay 3 annas per maund for wheat, which in the market town may fetch about Rs.4-8. A charge of about 6 annas would carry the same wheat from the centre of the Punjab to Karachi.

Apart from the possible introduction of cheaper forms of rural transport than the cart and camel or the improvement of roads, the chief means of reducing to the cultivator the cost of marketing agricultural produce is by providing local markets where too few now exist, so that the lead to market may be reduced to one which the cultivator will negotiate with his own cart.

Inquiry suggests that markets, or *mandis* as they are termed in the Punjab, should exist at intervals of from 20 to 25 miles. If at this distance the lead is within the ambit of the average cultivator and the area served would be large enough to attract a good attendance of buyers. Very small *mandis* are to be deprecated because of lack of competition.

Until recent times the cultivator sold practically all his produce to the village *bania*, to whom he usually owed money, and it was the *bania* who brought it to the market town and sold it to wholesale traders; but rapid changes are taking place, and though the village *bania* is still believed to be much the largest seller of village produce in *mandis*, cultivators, in increasing numbers, themselves cart wheat, cotton and rape seed to market and sell it there. For this desirable change there are many causes, the growth in the export trade, the work of the Agricultural Department in organising sales of special products like Punjab-American cotton, the spread of education and, most of all, the extension of the co-operative movement.

To further the good work thus begun, the Communications Board of the Punjab have kept the need for new, and well-spaced, *mandis* constantly in view in developing their road policy, and the hypothesis on which they now work is that "given good roads trade will flow easily to a *mandi* from within a 12-mile radius." On this assumption the needs of the Punjab cultivator for transport facilities have been surveyed and a map prepared showing the gaps in the *mandi* system which remain to be filled.

The importance of the *mandi* to the Punjab cultivator is very great. It is believed that 90 per cent. of the exported produce passes through these local markets. The Government is, therefore, further attempting to aid the marketing of agricultural produce by constructing model *mandis* in the colony areas. The lay-out of a modern local market town is as follows. The *mandi* serves 500 square miles of canal-irrigated land; it consists of a grain market, four or five cotton-ginning factories, a market for imported timber, iron and steel, and bazaars, with shops for supplying all the cultivators' wants. (Cotton goods, edibles of all sorts, brass and earthenware pots, tin-ware, petroleum stores, sewing machines and bicycles are the things that first catch the eye of the passer by in these market town bazaars). The grain market consists of a set of shops built round three or four sides of a rectangle; there is in front of them a wide brick pavement for unloading, displaying, weighing up and bagging grain. In front of the pavement is a wide metalled road enclosing an open space for parking carts. When the *mandi* is on the railway the grain market adjoins the station and it may even have a siding of its own.

Reviewing the position of marketing in the Punjab it may be said that facilities for the sale of wheat, cotton, rape seed and other exported field crops are good. The commodities now requiring and receiving further attention are fruit, vegetables, eggs, and light perishable produce generally. Except in the case of certain fruits there does not seem to be much export of this type of produce; it is bought and sold for local use. *Mandis* take a share of the trade, but much of it is done in the villages and on the volume of the business done, or the special needs of traders, not much information appears to exist.

Livestock in the province are generally sold at local fairs, which are held at stated times in many places. The fairs, which may combine some of the elements of an agricultural show with those of a market, are attended by the general public, as well as by itinerant herdsmen, shepherds and cultivators, and they may continue for a week. The Agricultural Department use these fairs for staging exhibits of their work, and demonstrating new implements in operation: and sports such as racing, and tent-pegging may be held to add to their attractions. The fair is, therefore, an important rural event. But except for the passenger traffic it makes small demands on transport, for the livestock of the Punjab are almost all of a kind that walks to market.

12. LOCAL SELF-GOVERNMENT.

The form of Central Government in the Punjab follows that in other Indian provinces of British India; it is well known and need not be referred to here, but it will be desirable to indicate the character and work of district boards and village panchayats; for their activities bear very closely on education, sanitation and other subjects affecting rural welfare.

For each of the twenty-nine districts of the Punjab, a district board was created by the Punjab District Boards Act, 1883, and by Statute certain duties were laid upon the boards. The Act provided for the imposition of further duties by direction of the Central Government, and, as the district boards gained experience, a number of matters were placed under their jurisdiction. The range of their functions is now very wide, and under their control are subjects as diverse as the management of public property and the registration of births, marriages and deaths; the construction and repair of public roads and the provision and management of hospitals, schools and markets; the supply of drinking water and the reclamation of soil; the planting of trees and the improvement of livestock; the provision of demonstration farms and the disposal of mad dogs. In some instances particular duties have been allotted to certain of the district boards, for example, the posting of Bombay cotton prices in the market-place of an important cotton tract, the purchase and sale of pure wheat-seed, and the management of a racecourse in a horse-breeding locality. At first the deputy-commissioner of the district was appointed chairman, and in nearly all cases he still occupies this position; but the policy is to make the boards non-official, and recently boards were informed that, in those districts in which three-fourths of all the members were elected by popular vote, permission will be given to Boards under certain conditions to elect a non-official chairman. At first little interest was taken in district board elections, but their functions bear on so many subjects of popular concern that the position has changed, and it is noted that in one of the two districts in which elections were held in 1925-26, 32 out of 34 seats were contested, " great interest was excited " and " in several cases there was rowdyism at the polls." There is a prescribed minimum number of meetings, but three boards only in 1925-26 held the minimum number; most of them meet monthly, and, as in the case of British county councils, important subjects are referred to committees.

The income of district boards in 1925-26 was Rs. 190 lakhs of which 57.3 lakhs come from local rates and government grants (under the headings education 53 lakhs, medical relief 2.3 lakhs, and civil works 22.6 lakhs) amounted to 77.9 lakhs; the balance came from such sources as school fees, profits on canals, pounds, fairs, ferries and arboriculture, and special taxes,

such as the profession tax. The expenditure of district boards in 1925-26 was about 184 lakhs, of which about 50 per cent was on education, 12.5 per cent on medical relief and public health, and 19 per cent on roads and other district works, excluding medical and educational buildings.

A second local authority concerned with matters affecting the welfare of the rural population is the village panchayt. An Act establishing panchayts came into force in March, 1922, and in 1926 there were three hundred of them in existence. Panchayts are required to undertake the improvement and maintenance of public ways, drains, the construction and repair of wells and tanks for the supply of drinking and bathing water, and the provision of burying or burning grounds. Other duties may fall to them; if called upon they must act as school committees, and they may undertake poor relief, tree planting, the improvement of village livestock, the promotion of cottage industries, the maintenance of libraries and the prevention of nuisances. They are further empowered to exercise "local option" in respect of drink or drug shops, and they may be called upon to try petty criminal and civil cases. Under this last function some 1,170 criminal and 5,290 civil cases were disposed of in 1925-26. The average sum decreed in civil cases was Rs.20-10. It is noted by the Punjab Government that on the whole the judicial work was well done and that it appears to have been appreciated by villagers. In view of the ryot's love for litigation a cheap and expeditious method of gratifying his instincts is useful, and though no more than a beginning has yet been made, it would appear that the village panchayt had in front of it a wide field of social service.

13.—PUBLIC HEALTH AND SANITATION.

Taking the province as a whole, it may be stated that the Punjab peasant is the sturdiest and best-fed specimen of his kind among those who now till the plains of India; but in recent years, at least, he has reached the unenviable position of showing a higher rate of mortality than do the inhabitants of any other province. This fact is accounted for by the liability of the Punjab to suffer from epidemics. The influenza epidemic of 1918, which the Director of Public Health refers to as the "greatest epidemic tragedy in human history," is estimated to have produced a death-rate of 51 per 1,000 in the rural areas of the Punjab; an epidemic of plague in 1924 killed 250,000 people; ten years earlier there had been another severe epidemic of plague and in 1908 there was a great outbreak of epidemic malaria. Those who have attempted to account for these epidemics have shown that a number of factors are involved; some of them common to Indian peasantry, e.g., the defenceless condition of villages, unprotected by sanitary safeguards when epidemics start; others special to the province. These special conditions do not seem to be closely connected

with the soil, or to be related directly to the recent spread of irrigation. To account for them one must literally look to the air, i.e., the predominating factors are meteorological. It is now claimed that from the rainfall of July and August it is now possible to predict with fair accuracy what the mortality from malaria will be in certain districts; and the temperature and atmospheric humidity of the months January to May are controlling factors in the spread of plague. The heavy death-rate from plague in 1924, for example, followed on a high rainfall in January and February, and abnormally cold humid weather from March to May. The epidemic was checked as soon as the weather became hot and the air dry.

In order to effect improvement in the sanitary conditions of the province, the old Sanitary Department was reorganised as a Public Health Department in 1920; and, as will be seen from the evidence of the Director, this department insist strongly on the maxim that prevention is better than cure.

The department aim at providing a medical officer of health and a sanitary inspector in each Punjab district, and in 1926 several medical officers and sanitary inspectors had already been appointed. As a reserve for dealing with epidemics throughout the province twelve epidemiologists have been appointed, and three others, with the assistance of a chemist, are engaged in laboratory studies.

The staff of the Public Health Department work in close co-operation with other departments. For propaganda the village schoolmaster is enlisted. The Rural Sanitary Board (under the Ministry of Agriculture) whose work has been referred to in connection with land drainage, is one of the department's best auxiliaries; and the engineering staff employed in sanitation, which has been increased, are in consultation with public health officers now doing much to improve water supplies. At the present time district boards are expected to take the initiative in improving water supplies and sanitation in villages; but owing to the large areas under their supervision, villages are apt to be neglected.

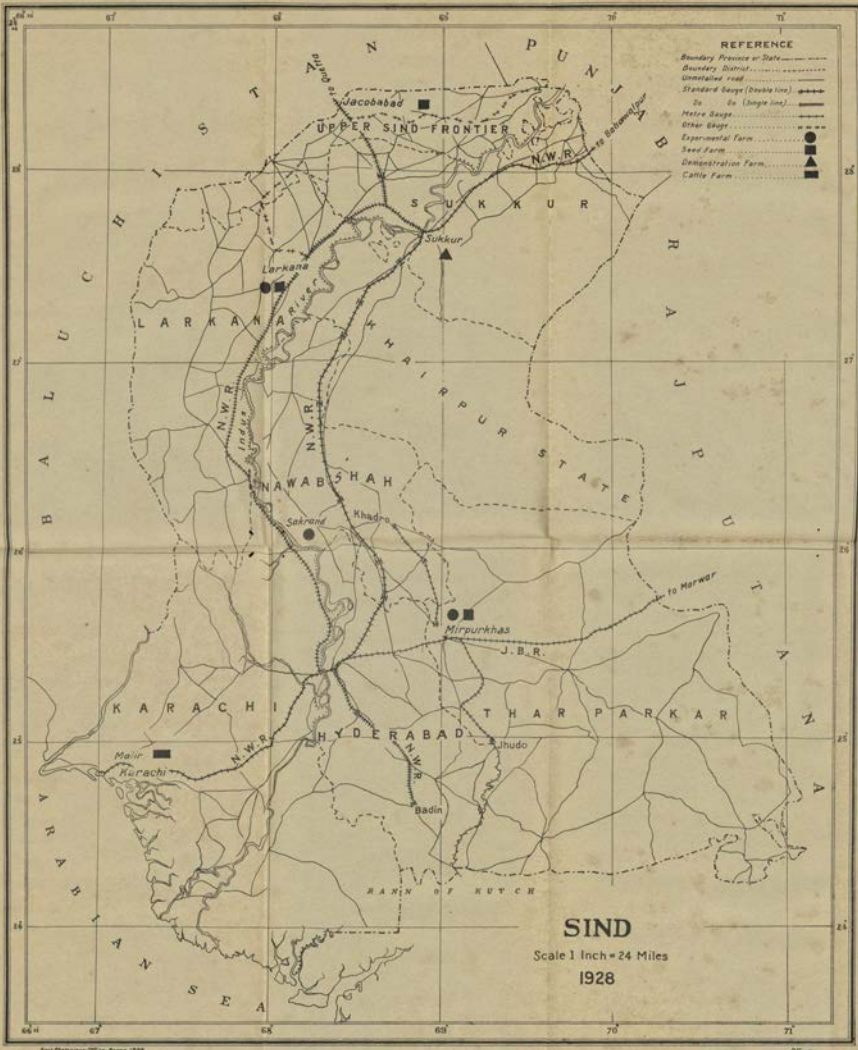
The Public Health Department maintain a Vaccine Institute and supply lymph for inoculation against smallpox to the vaccinators employed by local bodies throughout the province. They further maintain a staff of vaccinators who are employed in work in some of the smaller Indian States, thus incidentally protecting British districts from infection. The value of vaccination is everywhere understood, except in some small Hill States where apathy is due to ignorance. The conscientious objector is unknown in the Punjab. On the other hand, there is carelessness, as in all countries, and re-vaccination, especially of females, raises difficulties. Constant propaganda and effort are, therefore, required. At first inoculation against plague was unpopular, but the value of the protection given is now recognised and inoculation is sought for by villagers when outbreaks occur.

Some of the investigations on which the Public Health Laboratory workers are engaged are of special agricultural interest. For example, the question of the relation of malaria to rice cultivation has recently been studied. The tentative conclusion was arrived at " that rice cultivation appears to be in some measures conducive to endemic malaria." On the other hand, surveys made near towns have shown that there is no correlation between rice-growing and spleen rate. " It may, therefore, be inferred that conditions favourable to endemic malaria result not so much from the cultivation of rice itself as from the circumstances associated therewith. . . . . The conclusion is in fact irresistible, that many factors are concerned in the mechanism of endemic malaria and that the anopheline (mosquito) factor, although an important and essential factor, is incapable, in the absence of other essential factors, of determining the incidence of endemic malaria."*

The conclusion at which the Public Health Department arrive in placing an account of their activities before the Commission is indisputable; it is " if the Punjab agriculturist is to reap lasting contentment and benefit from improved methods of agriculture, the existing lack of protection from the incidence of disease will have to be considered along with improvements in regard to agriculture."

* Punjab Administration Report, 1924–25, p. 59.

(62857*—22) Wt. P 683—638/344 1000 6/28 H. St G 71.


REFERENCE
Boundary Province or State
Boundary District
Unmetalled road
Standard Gauge (Double line)
Do (Single line)
Metre Gauge
Other Gauge
Experimental Farm
Seed Farm
Demonstration Farm
Cattle Farm
BALUCHISTAN
PUNJAB
RAJPUTANA
KHAIRPUR STATE
UPPER SIND FRONTIER
SUKKUR
LARKANA
NAWABSHAH
KARACHI
HYDERABAD
THAR PARKAR
Jacobabad
Sukkur
Larkana
Sakrand
Khadro
Mirpurkhas
Jhudo
Badin
Malir
Kurachi
N.W.R.
J.B.R.
To Quetta
To Bahawalpur
To Marwar
RANN OF KUTCH
ARABIAN SEA
SIND
Scale 1 Inch = 24 Miles
1928

SIND

1. GENERAL FEATURES.

The Province of Sind, lying between 23° and 28° north latitude, forms the extreme north-western portion of the Bombay Presidency and consists of the lower valley and the delta of the Indus. It is bounded on the north by the Punjab and the Bhawalpur State; on the east by Rajputana; on the south by the Rann of Cutch and the Arabian Sea; and on the west by Baluchistan. The province, excluding the State of Khairpur, consists of seven British districts and covers an area of about 47,000 square miles.

The soil of the province is almost entirely alluvial, having been formed by the detritus of the Himalayas carried down by the river Indus from which it takes its name. For much of its length in the alluvial plain, the river bed is most unstable and the river prone to alter its course, sometimes by many miles, in a single flood season. There are traces of ancient river beds in many parts of the tract, and the Indus is known in past ages to have discharged its waters into the sea at a point about 200 miles east of its present mouths. For about five months in the year the level of the river rises above that of much of the surrounding country and thus enables the water to be drawn off for irrigation by canals which take off from the main river at points where its banks have for long been stable. To the west, the level valley of the Indus is bounded by the Kirthar Range of mountains which separates Sind from Baluchistan; this range has an average elevation of 2,000 ft. with some peaks rising to 7,000 feet. The hills are stony and barren but support a characteristic vegetation and afford grazing to large herds of cattle, sheep and goats.

The forests which consist mainly of *babul* (*Acacia arabica*) fringe the banks of the river for 300 miles.

The finest and most productive region lies in the neighbourhood of Shikarpur and Larkana in a long, narrow stretch extending 100 miles from north to south, enclosed on the one side by the river Indus and on the other by the hills of Baluchistan. Another great alluvial tract with an average width of 70 to 80 miles stretches eastward from the Indus. Sandhills abound near the eastern border, and large tracts remain sterile for want of irrigation.

The soil of Sind consists of a plastic clay strongly impregnated with salts and is remarkably fertile under irrigation.

No soil survey of the province has been made. Five types of soils are, however, usually distinguished: (1) *wariasi*, loose sand fit only for melon cultivation, (2) *kacha*, land resulting from recent inundation, (3) *chiki* or *paki*, hard black soil which has been under water for some time and which is usually very stiff and heavy to work,

(4) *rao* or *raewari*, soil enriched by the detritus of hill torrents, and (5) *dasar*, a term widely used for soft or light coloured but productive soil. Besides these, there is also the *kallar* or salt-affected land.

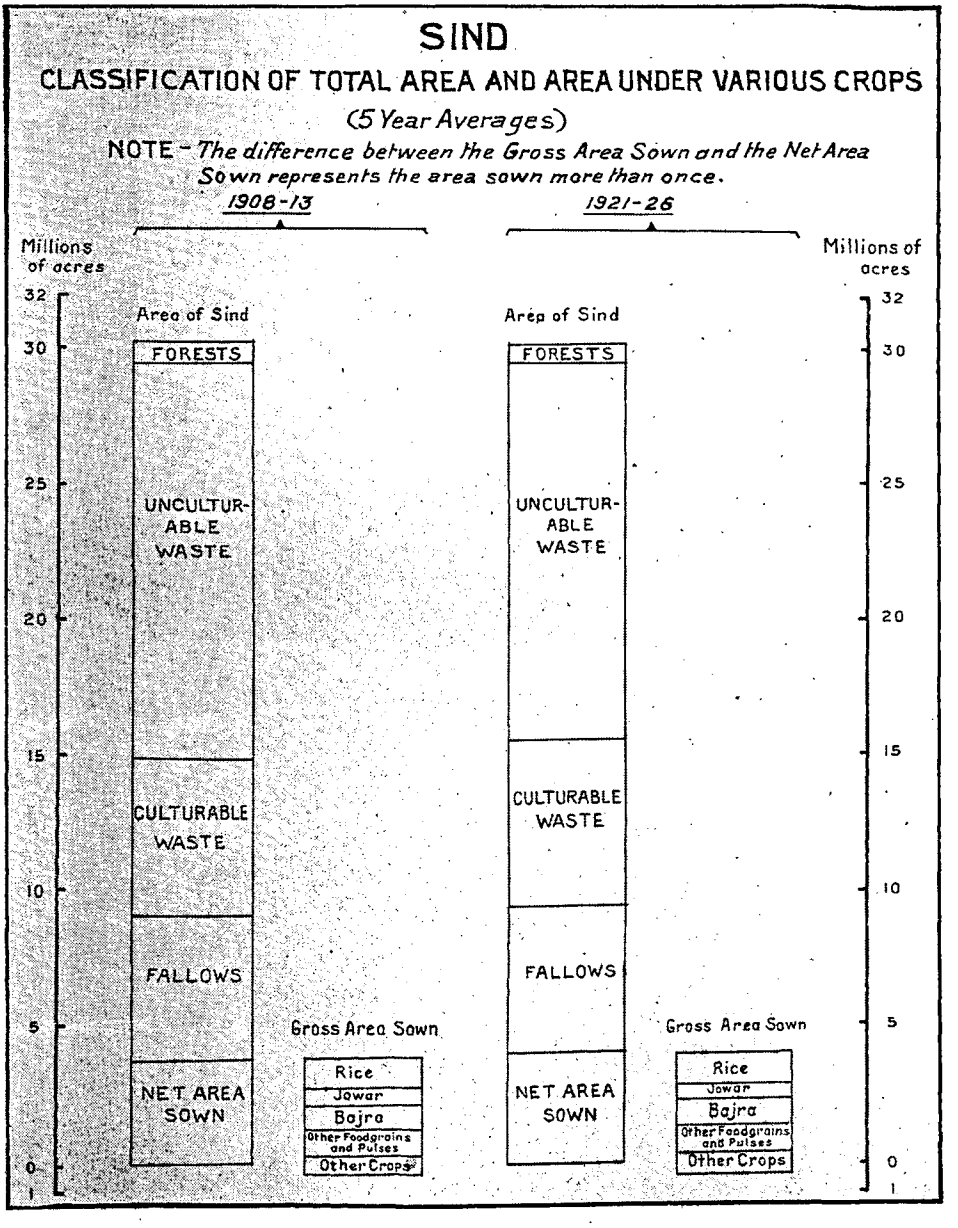
Owing to the absence of monsoon rainfall, the climate of Sind ranks amongst the hottest in India. On the coast, sea-breezes render it equable but, in northern Sind, variations of temperatures are extreme. For the whole province, the average mean temperature of the summer months is 95° and that of the winter months 60°. In the north, the summer maximum frequently rises to 114° and occasionally to 125°; while in the winter, frost occurs at night and, even in the day time, the temperature falls to 40°. Nowhere in India is the hot weather so prolonged.

The rainfall of Sind is very scanty and irregular; in some years, there may be no rain, and, in others, cyclonic storms may bring 16 inches in a day. The average is about 8 inches. Except in the two areas noted below, cultivation depends not upon the rainfall, but upon the river Indus. These areas are the hilly tract of Kohistan on the west, and the tract to the south-east of the province known as the Thar desert. These tracts are above the river valley and cannot be reached by canals; rainfall is uncertain and the cultivation is most precarious. The inhabitants are chiefly nomadic cattle and camel breeders, and, to them, agriculture is only a subsidiary industry.

The height and duration of the inundation of the river is dependent on the melting of the snows in the Himalayas and on the rainfall in the Punjab, and varies greatly. If the river remains high from May to September, a bumper harvest may be reaped over an area of 4·5 million acres. If the river fails, as it did in 1918-19, the area falls to 2·75 million acres and the outturn is very poor.

The most important crop in Sind is rice (1,000,000 acres). The next in importance is *bajri*, which covers almost the same area. The other important food crops are *juar* (600,000 acres), wheat (500,000 acres), and gram (200,000 acres). Amongst non-food crops, cotton was cultivated last year in 326,000 acres and oil-seeds in about the same area. During the decade, 1911-21, the minimum annual value of the crops in the whole of Sind was, according to an estimate made by the Agricultural Department, Rs. 11 crores in 1918-19 and the maximum Rs. 24·5 crores in 1916-17. The relative importance of the chief crops of Sind is shown by the accompanying diagram.

Rotation of crops is little practised in Sind. Large areas are kept fallow every year. The area privately owned but not cultivated exceeds the net cropped area. Government waste land including forest forms two-thirds of the entire area of the province and of this about a third is culturable waste.



To face page 360

A census of cattle is taken every five years; the following Table gives a summary of the results of the last five censuses :—

No.	Details	1905	1909	1915	1919	1924
		No.	No.	No.	No.	No.
			(*Figures in 000's*)			
1	Plough cattle	551	582	601	554	582
2	Breeding Bulls	8	10	8		22
3	Cows	537	717	705	617	792
4	She-buffaloes	223	282	283	259	329
5	Cattle for other purposes	390	515	581	390	600
	Total cattle ..	1,709	2,106	2,178	1,820	2,325
6	Total horses	78	84	81	71	79
7	Total sheep	302	424	514	564	624
8	Total goats	969	1,074	1,101	1,028	1,511
9	Total camels	113	116	117	117	169

The decrease in the census of 1919 was due to the removal of cattle to other regions owing to the absence of grazing in the rainless year of 1918-19. One noticeable feature is the large proportion of milch cattle and cattle for other purposes. The Sindhi drinks milk in large quantities, and when suffering from dyspepsia finds a remedy in camels' milk. The desert and unirrigated parts of Sind are pastoral tracts in which the keeping of cattle is the principal occupation of the population.

According to the last census, there were in 1924, 13 plough cattle, 25 milch cattle, and 13 cattle for other purposes for every 100 acres cropped. Throughout the province, the general condition of the cattle is good.

2. PROVINCIAL INCOME

GOVERNMENT OF

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25
Revenue Receipts				
Principal Heads of Revenue—				
Land Revenue	144·2	83·5	72·1	62·0
Excise	31·0	35·5	40·3	39·1
Stamps	16·0	19·4	20·2	19·8
Forests	8·0	6·2	6·3	6·9
Registration	1·8	1·6	1·5	1·5
Scheduled Taxes	....	....	0·2	0·6
Irrigation—				
Works for which Capital accounts are kept (Net receipts after deducting working expenses.)	—24·0	36·5	39·3	39·2
Works for which no Capital accounts are kept	0·5	0·5	0·1	0·1
Interest	1·7	3·6	2·7	1·8
Civil Administration—				
Administration of Justice	1·5	2·1	1·9	1·8
Jails and Convict Settlements	0·8	0·8	1·0	1·2
Police	0·2	0·3	0·2	0·4
Education	0·7	1·0	1·0	1·5
Medical	0·2	0·4	0·4	0·3
Public Health	....	0·1	0·1	0·2
Agriculture (including Veterinary and Co-operation).	0·4	0·4	0·7	0·7
Miscellaneous departments	0·1	....	0·1	0·1
Civil Works	0·5	0·9	0·7	0·9
Miscellaneous	1·8	2·2	3·2	2·6
Total ..	185·4	195·0	192·0	180·7

N.B.—1. As there is no separate budget for Sind, the above figures have been extracted from
2. Figures for Capital Receipts in Sind are not available.

AND EXPENDITURE.

BOMBAY (SIND)

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25
Expenditure charged to Revenue				
Direct Demands on the Revenue—				
Land Revenue	23·0	40·1	39·2	13·8
Excise	2·5	1·3	1·3	1·9
Stamps	0·7	0·9	0·8	0·7
Forests	4·2	3·5	3·6	4·1
Registration	0·8	1·0	0·9	0·9
Irrigation—				
Works for which Capital accounts are kept	11·4	12·9	16·2	21·5
Miscellaneous Irrigation Expenditure ..	38·2	23·1	13·5	23·1
Civil Administration—				
General Administration	14·3	20·7	19·6	44·8
Administration of Justice	10·0	9·6	10·0	11·5
Jails and Convict Settlements	6·3	5·9	5·2	5·9
Police	40·8	36·1	35·1	36·0
Ports and Pilotage	0·1	0·1	0·1	0·3
Education	23·4	23·0	26·6	23·8
Medical	5·9	4·6	5·3	5·3
Public Health	3·1	3·5	2·9	2·9
Agriculture (including Veterinary and Co-operation.)	3·5	3·3	3·3	3·4
Miscellaneous departments	0·3	0·3	0·3	0·3
Civil Works	22·2	10·4	6·5	8·0
Miscellaneous—				
Superannuation Allowance and Pensions ..	5·9	6·1	6·9	7·1
Stationery and Printing	1·2	1·3	0·9	1·0
Miscellaneous	1·5	1·3	4·0	5·2
Total ..	219·3	209·0	202·2	221·5
Capital Expenditure in Sind				
Construction of Irrigation Works ..	5·6	19·1	51·5	124·0
Capital outlay on Improvement in Public Health.	....	5·3	0·5	....
Civil Works not charged to Revenue	....	7·1	5·5	12·2
Total ..	5·6	31·5	57·5	136·2

the budgets for the Presidency of Bombay.

3. REVENUE ADMINISTRATION AND LAND RECORDS

Sind is a province of the Bombay Presidency and is under a Commissioner, who has considerably larger powers than those of an ordinary Commissioner of a division. Under certain Acts, he has the powers of a local government, whilst under others he has powers which in the rest of the presidency are exercised by heads of departments. There are seven districts in Sind, of which six are under Collectors and one under a Deputy Commissioner. The Collector or Deputy Commissioner is in charge of the revenue administration of the district and is also the chief magisterial authority, and the district registrar. For each taluka in the collectorate, there is an officer called the *mukhtiarkar* who, in addition to his revenue duties, is in charge of the sub-treasury and exercises magisterial powers. An assistant or deputy collector is in charge of a revenue subdivision comprising several talukas. The collection of the land revenue is performed by the *tapedars*, each of whom is responsible for a group of villages which varies in number from five to ten. Between the *mukhtiarkar* and the *tapedar*, there is a staff of inspecting officers known as supervising *tapedars*, of whom there is one to every four or five *tapedars*. The Manager of Encumbered Estates is an officer of the Indian or the Provincial Civil Service. He is appointed under the Sind Encumbered Estates Act, which was passed to provide relief to *jahagirdars* and *zamindars* in debt. The management of their estates is undertaken by the Manager upon an application by the landholders.

The functions of the Land Records Department are to provide statistics necessary for sound administration in all matters connected with the land, to reduce and simplify litigation in the revenue and civil courts, to provide a record of rights for the protection of all who have interests in land, and, lastly, to simplify and cheapen periodical settlement operations. A branch of the provincial Land Records Department is located in Sind and is under a Superintendent of Land Records. The work in the district is carried on by district inspectors, *tapedars* and supervising *tapedars*. Control over the district staff is exercised by the Collectors, the functions of the Superintendent of Land Records being limited to inspection and advice. A complete record of rights and interests in land has been prepared for the unalienated villages in the province except the Kohistan tract of the Karachi district and the desert tract of the Thar and Parkar district, and has proved of great value to the public.

Before the advent of the British in 1843, the land revenue was levied in kind as a share of the produce. The system was continued for some time but payment in cash was introduced at an early date. Later, a survey and settlement on the lines of what had been adopted in the Bombay Presidency was introduced in Sind, but had to be altered to suit the special conditions of a province where a large part of the land is left fallow every year. The assessment is fixed by the method known as irrigational settlement. In this settlement, the villages of a taluka are divided into groups arranged in accordance with the facilities which they enjoy for obtaining water and for the disposal of produce at a market. Rates are then prescribed for the different methods of irrigation in each group of

villages. The pitch of the assessment is governed by the trend of prices, the value of land, and the state of the canals. This system has the merit of leaving the occupant the choice of the best method of irrigation, season by season, suited to the height of the river and the water supply available. Assessment is levied on each survey number only when it is cultivated; the size of the number has been reduced to the area cultivable with one pair of bullocks. No assessment is collected on lands which are not cultivated, but to prevent the land lying idle, a fallow assessment is charged once in five years. The period of settlement is normally fixed at twenty years, except in areas where important irrigational projects are under consideration or which are particularly exposed to the vagaries of the river.

There are few tenant rights in existence. The bigger zamindars cultivate the lands through *haris* who are tenants-at-will and usually pay rent in kind. The smaller zamindars cultivate themselves.

4. THE CULTIVATOR.

The census of 1921 gave Sind a population of 3,280,000 which was only slightly in excess of the population of 1901. There had been an appreciable increase between 1901 and 1911 but this increase was wiped out by the influenza epidemic of 1918 which took a great toll of life in Sind, especially in rural areas. The decrease in rural population between 1911 and 1921 was highest in the Karachi district (14·7 per cent), and lowest in the Nawabshah district (6·6 per cent).

There are 27 towns in Sind and 5,107 villages. The province is sparsely populated, the average number of persons per square mile being 71. Of the population, 2·4 millions or 75 per cent are Muhammadans and 800,000 or 25 per cent are Hindus. If the population is classified by occupation, we find that 1·9 millions are landholders and tenants or agricultural labourers and their families. The non-agricultural population is 1·4 millions. The agricultural population can be divided into three classes, (1) the big zamindars, a small but very influential class, (2) the small zamindars or peasant proprietors and (3) the *haris* or ploughmen who have no direct interest in the land.

The number of holdings in Sind is about 220,000. Their size and distribution is shown in the following Table:—

1.	Under 5 acres	..	68,819
2.	Between 5 and 25 acres	..	93,959
3.	,, 25 ,, 100 ,,	..	42,015
4.	,, 100 ,, 500 ,,	..	11,596
5.	Over 500 acres	..	2,251

The total area in these holdings is a little over 8 million acres; the average area of the holding is 38·7 acres and the average assessment per holding about Rs. 54. The proportion of holdings in each class varies from district to district. The Upper Sind and the Thar Parkar districts have large estates. In Larkana and Sukkur, the proportion of large landholders is very small, but, in the former, they hold a considerable proportion of the land.

The *hari* is a tenant who pays rent usually on a share basis, the share being half the crop on flow land and one-third of the crop on lift

land. He is, as a rule, financed by the landowner himself, who also directs what is to be grown and how it is to be grown, while the *hari* provides his own men, bullocks and implements.

The problem of the consolidation of holdings was investigated but it was found that the evil of fragmentation does not exist in Sind to any large extent and that as large areas of land are still available, the problem has not yet become important.

In years of good inundation, the economic condition of cultivators in Sind is favourable. They are not so well off in the delta, as the region is malarial. The position of the farm labourer has improved very much in recent years, as there is a greatly increased demand for labour. The extension of peasant proprietorship under the Sukkur Barrage system will also benefit men who have the necessary industry and ambition to take advantage of the new conditions.

The staple food of the agrarian classes is either *juar* or *bajri*, except in the delta and the rice-growing parts of the north where rice is generally used. The consumption of wheat is increasing. All classes, except a few Hindus, eat flesh, fowl and fish. The ordinary villager lives in a low hut consisting of mud walls and a roof of thatch, with a hedge round it. Large sections of the people, however, especially in the delta, live in movable shelters of brushwood and thatch. The house of the zamindar is built of dry bricks with a flat roof, and is usually surrounded by a wall enclosing the court-yard.

The Sindhi is very hospitable and inclined to improvidence in his expenditure; and, in consequence, large numbers are in debt. Where there are no co-operative societies, the cultivator resorts to a *bania* who is both a shopkeeper and a moneylender. He advances to the cultivator whatever he requires on condition that the crop is brought to him for disposal. Wherever the co-operative movement has taken root, the cultivator is being freed from this incubus and is becoming independent. The cultivators have ample leisure after their agricultural operations are over; but are reluctant to leave their villages and go to towns to seek employment. Occupations, such as the care of livestock, goats, sheep and cattle are largely in the hands of special classes. For large works, labour has often to be imported from outside Sind. When the Sukkur Barrage is completed in 1931, and the irrigational system under it developed during the next generation, irrigation will be available for the whole year over the greater part of Sind instead of for four months, and full employment will thus be available for a large proportion of the population.

5. THE AGRICULTURAL DEPARTMENT.

The Agricultural Department in Sind is an integral part of the Department of Agriculture in the Bombay Presidency and is, therefore, under the control and guidance of the Director of Agriculture, Poona. Work in connection with agricultural problems in Sind began with the establishment of an experimental farm at Hyderabad in 1884, when experiments were made with American cotton and the Egyptian date palm; the distribution of wheat and rape seed in the Nara Valley was also commenced. Very little headway was, however, made until 1903 when the construction

of a perennial canal (the Jamrao Canal) suggested the possibility of growing long staple cotton and experiments were also undertaken with wheat, *berseem* and the irrigation systems in vogue.

In 1906, a special officer was appointed to carry out investigations into Sind conditions and especially to study the problems of cultivation of Egyptian cotton. This led, in 1907, to the appointment of a deputy director of agriculture for Sind. Since then, work has developed in several directions. Excluding the lower grades of assistants and the special staff employed in connection with the experimental work undertaken in view of the Sukkur Barrage, to which reference is made below, the staff now consists of—

(1) one deputy director of agriculture;

(2) one botanist. Although he is designated cotton breeder, he is also in charge of rice breeding and wheat breeding;

(3) a divisional superintendent of agriculture who is in charge of work in east Sind; and

(4) thirteen graduate assistants.

The Livestock Expert for the Bombay Presidency has control of a farm in Sind for the maintenance and improvement of the red Sindhi or Karachi breed of cattle. Sind can also indent on the services of expert officers of the Bombay Government, such as the Agricultural Chemist, Economic Botanist, etc.

The main lines of experimental work have been the following:—

(1) *The introduction of long staple cottons.*—Attempts to introduce Egyptian varieties have for the present been abandoned; and attention is now concentrated on the introduction of American cottons. The two Punjab types, 4 F. and 285 F., have now been introduced on a large scale, especially in the Jamrao area. These are high yielding cottons, but the cotton breeder in Sind has succeeded in isolating still higher yielding strains from the general Punjab stock. These Punjab and American cottons are being multiplied as fast as possible; and it is hoped that Sind will shortly be self-dependent in the matter of American cotton seed.

(2) *The improvement of Sind* deshi *cotton by selection.*—Of the several strains isolated during the last few years, the variety known as 27 W. N. has been selected for distribution and has become popular.

(3) *The improvement of wheat.*—Here the work being done is the introduction of Pusa and Punjab wheats as well as the development of high yielding strains of Sind wheat. Pusa 12 has become the standard type of wheat in upper Sind. Two new strains have, however, now been evolved which are doing even better than Pusa 12. It is now possible to recommend different varieties and improved strains of wheat for different parts of Sind, and these have already become very popular. A wheat seed farm is maintained at Jacobabad.

(4) *The improvement of rice.*—Experimental work on rice has been recently taken up; and early and more prolific types have now been isolated which, on experimental areas, give an increased yield of 20 to 30 per cent. These are now being tried on a large scale in cultivators' fields.

(5) *Work on agricultural implements.*—Agricultural implements used in Sind are generally very crude. An appreciable advance has

now been made by the department in the introduction of the Egyptian plough and various types of implements of economic value.

The establishment of the Sukkur Barrage canal system will revolutionise the character of the agriculture in Sind. When the scheme is completed, the cropped area in Sind will be increased by two to three million acres annually, and cropping will be possible throughout the year. New and difficult problems will arise when perennial irrigation is introduced into a country which has hitherto been watered only during a small part of the year. The Government of Bombay, therefore, appointed, in 1923, a committee to make suggestions as to the best way in which such problems should be tackled. The committee recommended the starting of experimental work at once under the best and most scientific direction obtainable and the finance thereof on a liberal scale ; and, in particular, (*a*) the establishment of three first class experimental stations : one on the right bank of the Indus, preferably at Larkana, another on the left bank of the Indus at Sakrand, and a third at Shadipalli for the Eastern Nara tract ; (*b*) the establishment of five subsidiary stations ; (*c*) experimental work on fruit culture and cattle breeding ; (*d*) larger expenditure on propaganda, the provision of higher agricultural education in the province itself, and the separation of the Agricultural Department in Sind from that of the presidency proper, the former being placed under the sole control of a local Director of Agriculture. The total capital cost of this scheme is estimated at Rs. 7,69,000 ; and the recurring cost, Rs. 4,10,000. The Government of Bombay accepted the recommendations with certain reservations but have not yet succeeded in finding the finance necessary. For the present, provision has been made only for the new experimental station at Sakrand with a Director and a botanist, a soil physicist and chemist, a horticultural expert and six graduate assistants under him ; and also for an agricultural engineer for Sind. The land at Sakrand is typical of large areas in the country. The problems which the station is required to solve are mainly three : (1) to determine what crops can most profitably be grown under Barrage conditions in central Sind, and to breed types of such crops ; (2) to find the best way of using the water in the prevailing conditions and (3) to find out the effect of perennial irrigation on the soil. Experimental work on all these problems was started at the station in 1926.

Demonstration and propaganda.—Two difficulties in the way of introduction of agricultural improvements in the past have been the illiteracy of the people and the want of proper finance. The close co-ordination of the departments of Agriculture and Co-operation in Sind is helping the solution of the question of finance. Since 1922, the carrying out of agricultural propaganda in northern and central Sind has been entrusted to the Assistant Registrar. The general control of the work is in charge of a divisional board composed of six members of whom four are non-officials and two officials—the Deputy Director of Agriculture, and the Assistant Registrar. Taluka development associations have been particularly successful in Sind, and there are fourteen such associations now in existence. They have demonstrated

the value and extended the use of improved seed, implements, and modern methods of cultivation, have distributed large quantities of cotton and wheat in many areas, and are becoming an essential part of agricultural propaganda in the country.

Agricultural education.—As there is no provision for the imparting of higher agricultural education in Sind, scholarships have been given since 1907 to enable students from Sind to go to the Poona Agricultural College. Selections are made by the Commissioner, and each scholar signs a bond that he will work in the Agricultural Department for five years after graduation if his services are required by the department. From 1918 to 1922, these scholars were sent to the Punjab Agricultural College at Lyallpur instead of to Poona; but since 1923, the scholarships have again been transferred to Poona, as the Punjab authorities demanded the full cost of their training. The number of scholarships awarded at present is six per annum. Besides these scholarship-holders, there are a few private students from Sind at the Poona Agricultural College.

In 1912, a school for imparting vernacular agricultural education to boys belonging to cultivating classes was opened at Mirpurkhas with the object of enabling them to improve their own lands, to manage the estates of zamindars, or to enter agricultural service. The school never became popular and was closed in 1922. Since 1924, nine agricultural bias schools have been opened in Sind.

The cost of the department in Sind last year was Rs. 1,55,908. This is exclusive of the cost of the Sakrand farm, for which the amount budgeted was Rs. 1,35,000.

Livestock—Cattle breeding and dairying.—Sind is the home of three breeds of cattle of considerable merit:

(1) the Red Sindhi or Karachi, the best milking breed in India;

(2) the White Sindhi or Thar Parkar, a good milker and an efficient draught animal;

(3) the Bhagnari from the borders of Baluchistan, one of the best draught breeds in India.

The department has started a farm close to Karachi for the maintenance and breeding of the Red Sindhi. This farm contains the best milking stock in the country. A few Thar Parkar animals also are kept on it but a proposal is under consideration to start a separate farm for that breed in the Thar Parkar country. There is no provision for a similar provision for the Bhagnari breed of cattle. A small herd of Murrah or Delhi buffaloes is kept at Sukkur.

Cattle breeding in Sind is under the control of the Livestock Expert who works in co-operation with the Deputy Director of Agriculture. Premium bulls are given out by the department to selected cultivators on certain conditions and this system is now specially used for the provision of good Bhagnari bulls in upper Sind.

6. THE VETERINARY DEPARTMENT.

The Veterinary Department in Sind is independent of the department in the presidency. Sind has a separate Superintendent who is also in charge of Ajmer-Merwara. His staff consists of two veterinary inspectors

and 21 assistant surgeons, 18 of whom are in charge of dispensaries and 3 are on reserve duty. Of the 18 assistant surgeons in charge of the dispensaries, one is a local board servant.

The number of veterinary dispensaries is 18; the total number of patients treated at these dispensaries last year was about 26,500; medicine and advice were also given in the case of 3,800 other animals not brought to the dispensaries. The dispensaries are under the control of the district local boards, the assistant surgeons in charge being supplied by Government.

Besides supervising the work of the dispensaries, the Veterinary Department is also engaged in the prevention and cure of contagious diseases, among which rinderpest is the most common. Other prevalent diseases are foot-and-mouth disease and hæmorrhagic septicæmia. Anthrax and black-quarter also occur at times. The number of animals inoculated in 1926-27 was nearly 13,000.

The Veterinary Department in Sind also supervises horse breeding operations. There are nine stallions in the province towards whose maintenance Government contributes half the cost.

The total cost of the department for last year was about Rs. 1,84,000 out of which Rs. 90,000 came from provincial revenues and Rs. 94,000 from the local authorities. The latter amount includes a sum of Rs. 24,000 paid by the Wadia Trust.

7. IRRIGATION.

Practically the whole cultivation in Sind depends on irrigation by canals from the river Indus. The inundation of the river, which begins in May and subsides in September, depends on the melting of the snows in the Himalayas and, to a large extent, upon the rainfall in the Punjab and the consequent accretions to the Indus flood from its five tributaries in that province. The water carried by the river varies from 20,000 cusecs in February to 950,000 cusecs in August. The water is gauged at several points and, when the level reads above 13 feet at Bukkur and 17 feet at Kotri for the greater part of the three months June, July and August, the canals receive an adequate supply. If the level of the river rises to this height in May and does not fall below it till September, the cultivating season is prolonged and the harvest is bountiful, but such years are rare.

For some 400 miles from Kashmor in the north to below Tatta in the south, the river is confined by almost continuous earthen embankments; the height of these embankments varies from ten to twenty feet according to the height of the bank of the river; it is only at rare intervals that the bank is so high as to require no embankment. When the river level rises above 16 feet at Bukkur or 22 feet at Kotri, there is serious danger of breaches in the embankment and of grave damage by flood. As the Indus runs through soft alluvial sand in most places it is liable to change its course by several miles in rapid movements and the task of protecting the embankments calls for constant vigilance, and involves heavy expenditure by the State. These embankments have been constructed and gradually improved and strengthened in the last fifty years: at dangerous points, the earth wall is faced with brick or stone.

The system of irrigation from inundation canals existed before the British assumed control of Sind in 1843. These canals have been continuously extended and improved and new canals have been constructed so that, at the present date, 7,925 miles of canals are under the administration of the Irrigation Department. The supply of water is controlled by masonry head works. For the most part, the water runs on a higher level than the surrounding fields and flows on to them through distributaries which are also controlled by masonry outlets. Dams and regulators are constructed at suitable intervals to raise the height of the water in the canals. In certain tracts, particularly in the centre of Sind on the left bank, the land is higher than the canals and the water has to be raised by lift. The method commonly adopted is that of the Persian wheel worked by bullocks or camels.

In order to guard against the erosion of the embankments, a channel several miles wide has been left for the swings of the Indus and, in this tract, considerable areas are cultivated on the moisture left in the soil after the subsidence of the inundation. These are the winter crops, wheat, oil-seeds and pulses. Of the total present cultivation of Sind, 72 per cent is *kharif* and 28 per cent is *rabi*.

The irrigation system in Sind is now in process of being converted from an inundation to a perennial basis by the construction of the Sukkur Barrage and of a new system of canals which will run from the Sukkur Barrage on both sides of the river; on the right bank to the west for 132 miles until the Kohistan hills interpose a barrier close to Sehwan; on the left bank to the east over 205 miles past Hyderabad to the Rann of Cutch and to the elevated sand-hills of Thar Parkar. It is estimated that this scheme will alter the irrigation of two-thirds of the present irrigated area of Sind, rendering water available for the whole twelve months of the year instead of for the short inundation period of four months. The system will also supply water by flow to large tracts now irrigated at considerable expense by lift. It will also provide water to 3·5 million acres which now have no available supply for irrigation. The area commanded by this scheme is 7·5 million acres, of which it is anticipated that 5·5 million acres will eventually be cultivated annually. This area of 5·5 million acres cultivable by this scheme exceeds the present culturable area of Egypt by 500,000 acres.

The project is estimated to cost nearly Rs. 20·25 crores, of which 5·5 crores are debited to the Barrage and 14·75 crores to the new canals. The Barrage is located three miles below the gorge of the river Indus between Sukkur and Rohri. It is to be equipped with movable gates which will be raised when the inundation rises and will be lowered when it falls so that the level of the water may be retained at a height sufficient to fill the canals which take off above the Barrage. It is anticipated that with the supply of water throughout the year the cultivating season will be largely altered and two-thirds of the area will be brought under crops in the winter season and one-third in the summer season. The cultivating season for cotton will be prolonged from four

months to eight months, enabling the substitution of long staple cotton for the less valuable short staple varieties. It is also anticipated that wheat and oil-seeds will also be substituted for the less valuable crops of millet, while the area under rice will remain unchanged. The main difficulty of the cultivator at the present time is the lack of employment for many months of the year and it is hoped that, in this tract, this difficulty will be wholly relieved.

The plain of Sind is so level, having an average slope of six inches to the mile from north to south, that there are few natural drainage channels; and the problem of supplying drainage in conjunction with the new irrigation scheme is receiving the attention of the engineers.

8. FORESTRY IN RELATION TO AGRICULTURE.

The area in charge of both the Forest and Revenue departments is only 1,171 square miles. The forests which are situated along the banks of the Indus run in narrow strips from a quarter of a mile to two miles in breadth. They are liable to erosion and are seriously affected by changes in the course of the Indus.

The indigenous trees consist of *babul* (*Acacia arabica*), *kandi* (*Prosopis spicigera*), *bahan* (*Populus euphratica*) and two kinds of tamarind. A valuable tree, sometimes found, is the *tali* (*Dalbergia sissoo*).

Babul trees produce wood suitable equally for building, fuel and ploughs; seed pods useful for feeding cattle; bark for tanning; and leaves and thorns as a favourite fodder for camels and goats; within the limits of central Sind they are a host for the lac insect. *Bahan* yields light soft wood for building purposes.

The number of cattle admitted to grazing in the forests in 1925-26 was nearly 100,000, equally divided between horned cattle and sheep and goats. About 2,000 camels were also admitted to browsing. The average expenditure on the forests in Sind for the last quinquennium came to Rs. 3·75 lakhs, while the revenue was Rs. 6,85,000.

Besides the State-owned forests mentioned above, it is not uncommon in Sind for zamindars to have private groves of their own. These are known as *huris* which are well preserved and are a source of appreciable profit to their owners.

9. GENERAL EDUCATION.

Educationally, Sind is very backward: the percentage of literacy for all communities is 4·1 only; but in the case of Muhammadans it goes down to 2·7 and amongst the advanced communities rises to 12·6. The fact that the population is widely scattered is a great obstacle in the spread of literacy. The main reason, however, is the general apathy to education of the Muhammadans who form three-fourths of the total population. Recently, however, this community has shown greater interest in educational matters, and more rapid progress may be expected in the near future.

The educational system in the province is identical with that of the presidency proper. The superior staff of the department in Sind

consists of an educational inspector, an inspectress for girls' schools, a senior deputy inspector for each district except Thar and Parkar where there is a deputy inspector and a special deputy inspector for Urdu and Mullah schools.

The changes in the administration of primary education which have been made by the Primary Education Act of 1923 have been described in the introduction to the volume of evidence for the presidency proper. All the district local boards in Sind, with one exception, have taken over the control of primary education in accordance with the terms of the Act.

Institutions for higher education are confined to :—

(1) two arts colleges at Karachi and Hyderabad ;

(2) a special Medical School at Hyderabad, where men are trained for the subordinate medical service ;

(3) an engineering branch of the Arts College at Karachi ; and

(4) a Law College at Karachi.

Sindhi students also attend the institutions in the presidency proper.

The total number of students in primary schools in 1925-26 was a little over 100,000, of whom girls numbered one-fifth. Thus about 21 per cent of the school-going population was at school. There is the same wastage in primary schools in Sind as in the other parts of the presidency, the attendance falling rapidly in the upper classes. Of 100 students attending primary schools, less than nine reach the upper primary (vernacular middle) standards.

As Sind is predominantly a Muhammadan province, special reference may be made to education amongst that community. The number of Muhammadan pupils receiving instruction in Sind last year was 66,818 of whom about 17 per cent were girls. Fifty-four thousand of these were in primary schools, 2,700 in secondary schools, 86 in colleges and 365 in special and training schools. Of the students in primary schools, about 36 per cent were in Mullah schools, in which, under the control of religious teachers, religious instruction as well as secular is given to Muhammadan boys. These schools are recognised by the State and receive grants graduated according to their efficiency. There are now 724 of these schools, and the grants-in-aid amounted to Rs. 3·25 lakhs. The expenditure on Muhammadan education in Sind was roughly estimated at Rs. 22 lakhs out of which Rs. 12 lakhs were met from the provincial funds. The total expenditure on education in Sind last year was Rs. 50 lakhs, out of which Rs. 27 lakhs were contributed from provincial funds.

10. CO-OPERATION.

The co-operative movement in Sind is of comparatively recent growth. Attempts at the formation of societies started with the passing of the Co-operative Credit Societies Act of 1904. Little progress was, however made until a separate Assistant Registrar for Co-operative Societies was appointed in 1918. Up to that date, only 65 societies had been organised,

which had a membership of about 3,000 and a working capital of Rs. 1,63,000 only. Many of these societies existed only in name and did little work. The Assistant Registrar, on his appointment, carried on vigorous propaganda, secured the co-operation of all classes of agriculturists, revised the constitution of existing societies, and drafted by-laws to suit the existing conditions in Sind. The by-laws were modelled on those in force in the Punjab where conditions were more or less akin to those prevailing in Sind. The chief difference in the constitution of the societies in Sind and those in the presidency proper is that the former are organised on a share basis—a system which is described below.

The difficulties in the way of organising societies were many. The Registrar of Co-operative Societies, in 1917, reported that the societies were still "at too elementary a stage to justify a prophecy that the movement will ever take firm root in Sind." The general illiteracy prevailing in the province, the aversion of the bulk of the population, which is Muhammadan, to the taking of interest, the predominating influence of the big zamindars, and the prevalence on a large scale of the *hari* system under which the cultivator has no direct interest in the land, as well as the absence of big villages were great handicaps in the rapid development of the movement, but, since 1918, the movement has developed rapidly in the province. The co-operation of the educated leaders of the people has assisted this development. The number of societies increased from 65 in 1918 to 481 in 1923. During the same period the membership and working capital increased from 3,000 and Rs. 1,63,000 to 19,000 and Rs. 38 lakhs respectively. At the end of March 1927, the corresponding figures were 863, 39,247, and Rs. 137 lakhs. The results of the working of the movement have been very striking. Not only are members financed for their current needs, but, in a very large number of cases, they have been freed from their debts. Mortgage bonds and conditional sale deeds have been redeemed, habits of thrift have been inculcated, and several members have purchased fresh plots of land out of their savings. Most of the members have severed their dealings with the moneylender altogether. A striking feature in the movement in Sind is the large percentage of owned capital of primary societies and the large amount of share capital of the members, showing how well the lesson of thrift has been inculcated. The by-laws of these societies provide that the minimum holding of each member shall be one share of Rs. 20 payable by yearly instalments of Rs. 2. But from the beginning each member has taken up a substantial number of shares, increasing his contributions from year to year. The result has been that in practice each member holds a considerable number of shares. It is a common thing in a society of five years' standing for a small zamindar to hold Rs. 150 to Rs. 300 and for a *hari* to hold Rs. 100 to Rs. 150 in shares. The reserve fund of the societies now amounts to nearly Rs. 4·5 lakhs. It has reached a substantial figure in the older societies. Some of the societies on the Jamrao Canal now have sufficient owned capital to meet the total needs of all without any outside borrowing.

The co-operative movement in Sind had until recently catered for the needs of the small zamindars only. The big zamindars in Sind, however, are as heavily in debt as the smaller ones. These, in two districts, have now been organised into two *zamindari* banks on the co-operative model. Although they have been in existence only for two years, these banks have now a working capital of over Rs. 5 lakhs and have been of substantial benefit to their members.

The progress made would have been impossible of achievement, had arrangements for financing the movement through the organisation of central banks not been made. Till 1918-19, the societies obtained finance from the Bombay Provincial Co-operative Bank. Since then, central banks have been established in Sind itself. The first to be established was the Central Bank at Karachi. At present not only is there a bank for every district, except the Upper Sind Frontier, but the Karachi Bank, besides acting as a central bank for the district of Karachi, also serves as an apex bank for the whole province. There is now a complete network of central financing institutions in the province, and there is no difficulty in getting sufficient funds to finance the primary societies. The total working capital of the six central banks in Sind was Rs. 64 lakhs last year.

The ideal of spreading agricultural improvements through co-operative societies has also been fulfilled to a considerable degree in Sind. There are eleven seed societies organised for the distribution of improved varieties of seed. The main work of improvement, however, has been done through taluka development associations, and the few simple but substantial improvements which the associations have been able to demonstrate have been largely adopted by the members of co-operative societies. Amongst the improvements introduced may be mentioned the distribution of improved varieties of wheat (Pusa 12) and cotton (27 W. N.), the large distribution of the Egyptian plough, and the introduction of the Raja and monsoon ploughs, the Archimedean screw and various clod-crushers. The work of these associations is done almost entirely through members of co-operative societies. They appoint *kamgars* and supervisors to visit villages, to hold demonstrations of improved seed, implements, and modern methods of farming. Experiments are also being made to get the associations and supervising unions to indent for the agricultural and other domestic requisites of agriculturists and to distribute them amongst their members. So far, the experiments have proved very successful.

The whole work is done, under the general supervision of the Registrar of Co-operative Societies, by the Assistant Registrar stationed at Hyderabad. He has a deputy working under him and also six auditors. The Assistant Registrar is helped in the work of organisation and supervision by honorary organisers as well as by the supervising unions into which the societies are now being organised. The Bombay Provincial Co-operative Institute has also a divisional branch in Sind, which has been doing valuable work in the way of carrying on co-operative propaganda, holding conferences, and training classes for

members, secretaries, and honorary organisers, and conducting a co-operative magazine. District branches of the Institute are also being established.

11. COMMUNICATIONS AND MARKETING.

In 1851, Sir Bartle Frere found in all Sind "not a mile of bridged or metalled road, not a masonry bridge of any kind; in fact, not five miles of any cleared road." The sandy nature of the soil, the difficulty of getting metal, the liability to inundation make the construction and upkeep of roads a very difficult and expensive matter; and, in consequence, even now Sind is badly served in the matter of roads. There are no doubt recognised routes by which traffic is carried in the dry season between large towns; *e.g.*, from Karachi to Shikarpur and from Hyderabad to Jodhpur and Multan. These routes, however, were, and still are, mere tracks suited to the camel but bad for wheeled traffic. In north Sind, the use of carts is more common, but in the other parts camels, pack bullocks, donkeys and horses form the usual means of transport. Where carts are used, they are very heavy and primitive and are a great strain on the bullocks.

Before the advent of the railway, the river was one of the chief means for the carriage of produce over long distances and it is still used for that purpose. It was under the charge of a special government department known as the Indus Conservancy Department which, however, was abolished in 1906. It is now under the charge of the Indus River Commission. Although the navigation of the river has engaged the serious attention of Government since the time, nearly a century ago, when it was necessary to use the river for the passage of troops to Multan and Afghanistan, the conservancy of the river really commenced only with passing of the Bombay Act I of 1863 which provided for the registration of vessels and the levy of pilotage fees, the sums so realised to be expended in removing obstructions on the river and improving its navigation.

Sind is now connected by rail with all parts of India and through Baluchistan up to the Afghan and Persian borders. By sea, there are regular services to Bombay and to the Persian Gulf; while passenger steamers leave the port of Karachi regularly for Europe. Karachi is now becoming a port of call for air traffic.

The main arteries of traffic are now the railways, the most important of which is the North Western Railway which connects Karachi with the Punjab. A new broad gauge connection with Delhi through Rajputana is again under consideration. The first railway to be started was on the right bank of the Indus. As this line was frequently breached, an alternative line on the left bank was constructed and this has now become the main route to the Punjab. A line was opened from Hyderabad to Badin in 1904, and an extension is now proposed across the Rann of Cutch to meet the Bombay-Baroda and Central India Railway at Viramgam, thus affording through communication, without break of gauge, from Sind to Bombay. At present there is a meter

gauge connection from Hyderabad to Ahmedabad by the Jodhpur-Bikaner Railway.

There are a number of feeder lines in Sind which connect important marketing places and carry a large part of the export produce of the country. These are the Hyderabad-Badin, Mirpurkhas-Khadro, Mirpurkhas-Jhudo, Larkana-Shahdadkot, and Jacobabad-Kashmor lines.

Marketing.

Crops are ordinarily sold in the field. The trader goes round to collect the cotton, wheat, rice or oil-seeds and brings it by camel load to the nearest market or railway centre. Rice is purchased locally from producers, husked and parboiled in the chief local centres like Larkana, and then exported. A large number of rice mills have now been erected in all the rice growing centres. No grading is done for the internal trade, but traders sometimes grade for their own benefit or under pressure from the ultimate buyers.

The chief hindrances to proper marketing are the bad condition of the roads, the lack of carts, the want of standardised weights and measures, and the lack of storage accommodation.

12. LOCAL SELF-GOVERNMENT.

Local self-government in rural areas dates from the year 1884. The proportion of elected and nominated members on local boards was originally fixed at two-thirds and one-third respectively. The system established by the Local Boards Act of 1923 for the Bombay Presidency holds good for Sind, and the description need not be repeated here. The income of all the boards in Sind in, 1925-26 was Rs. 34·25 lakhs, while their expenditure was Rs. 32·5 lakhs. Income from local rates came to Rs. 10 lakhs, the grants from Government amounted to Rs. 16 lakhs of which Rs. 9·5 lakhs was for education, Rs. 50,000 for medical purposes, and Rs. 5·25 lakhs for civil works. The total expenditure on education was Rs. 12·75 lakhs; on hospitals, dispensaries, etc., Rs. 2·75 lakhs; on veterinary charges Rs. 42,000, and on communications Rs. 6·75 lakhs.

The greater part of the revenue is usually spent by the district local board on works of general utility to the whole district; but each taluka local board has funds at its disposal to enable it to carry out and maintain works of purely local utility for which it is primarily responsible. At least one-third of the revenue derived from the one-anna cess must be spent on education.

Local boards are bound, so far as their funds permit, to make adequate provision for education, water supply, construction and maintenance of roads, hospitals, dispensaries and markets. They have also the discretionary power to spend money on the establishment and maintenance of model farms, the improvement of breed of cattle, and the advancement and improvement of agriculture and local industries generally.

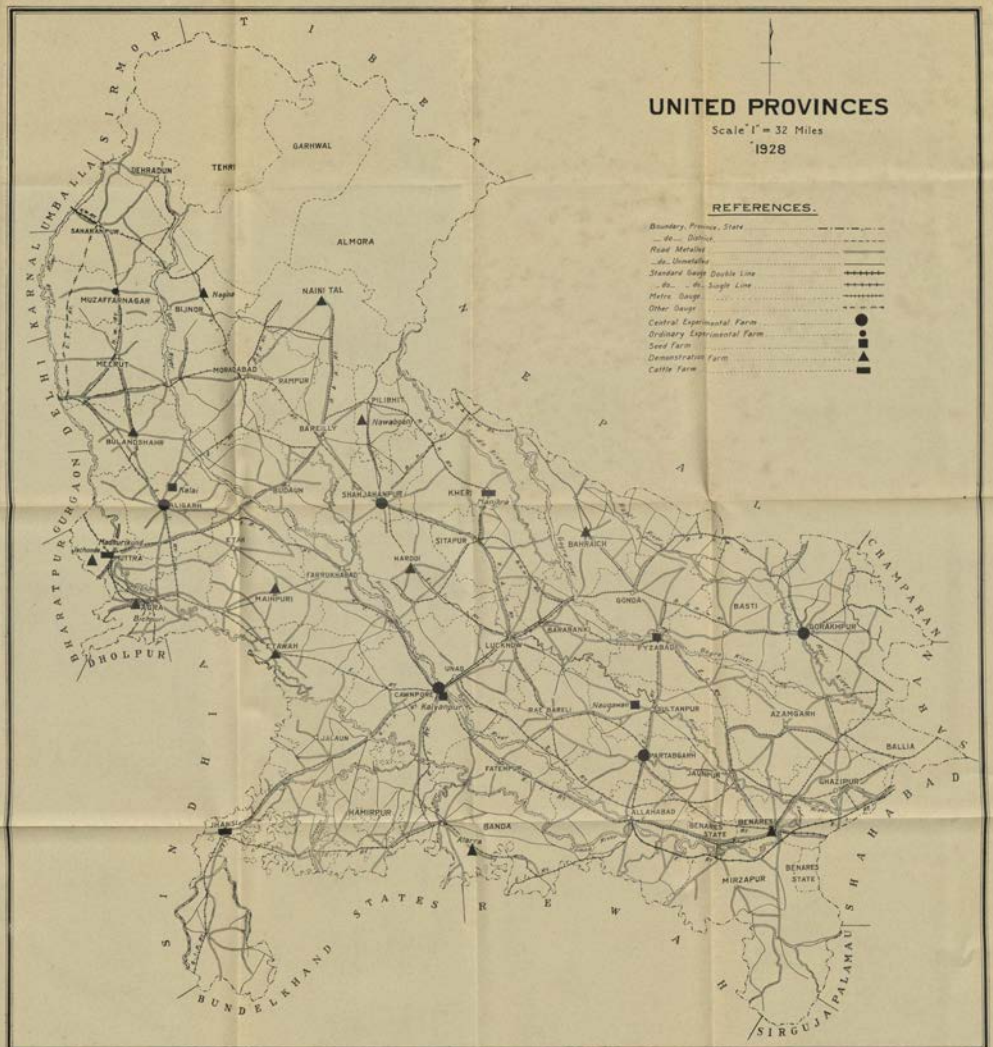
13. PUBLIC HEALTH AND SANITATION.

Malaria is the most prevalent disease in Sind. The proportion of deaths ascribed to this cause in Sind is greater than in the presidency. While the death rate from malaria for the presidency as a whole in 1926 was only 2·83, in Sukkur, it was 15·13 and, in Thar and Parkar, 14·50. In that year, all districts in Sind suffered heavily from malaria owing to the high floods and heavy rainfall. Quinine can be obtained through post offices and is also distributed free to school children. The efficacy of quinine in the prevention and cure of malaria is now well recognised in the province and the free distribution of the drug is popular.

Other prevailing diseases are small-pox and cholera. The latter as well as plague, which used to take a large toll at one time, have now been brought under control and Sind has practically escaped from them during the last few years. Small-pox, however, often occurs. The attacks during each of the last two years from this disease were between 5,000 and 6,000 each year and the deaths varied from 1,100 to 1,200.

The birth rate in Sind in the years 1925 and 1926 was 20·58 and 24·32 per thousand respectively, the figures for rural areas being 21·69 and 17·80 respectively. Faulty registration as well as the nomadic habits of part of the population make the figures unreliable. The death rate in the same two years was 19·29 and 16·96 respectively as compared with a rate of 15·20 for the quinquennial period. The urban rate (29·97) greatly exceeds the rural death rate (17·37), but this again is probably due to faulty registration. Infantile death rate is very high, 185 for 1,000 registered births.

Every district except the Upper Sind Frontier has a Civil Surgeon. For sanitation and vaccination there is an Assistant Director of Public Health for the province who has his own staff of inspectors and vaccinators. There are several hospitals in the district towns and numerous charitable dispensaries in the smaller towns. Vaccination has made satisfactory progress.


UNITED PROVINCES
Scale 1" = 32 Miles
1928
REFERENCES.
Boundary, Province, State
do. Distrct.
Road Metalled
do. Unmetalled
Standard Gauge Double Line
do. do. Single Line
Metre Gauge
Other Gauge
Central Experimental Farm
Ordinary Experimental Farm
Seed Farm
Demonstration Farm
Cattle Farm
TIBET
NEPAL
SIRMOR
UMBALLA
KARNAL
DELHI
GURGAON
BHARATPUR
DHOLPUR
SINDHIA
BUNDELKHAND
STATES
REWAH
SIRGUJA
PALAMAU
SHAHABAD
CHAMPARAN
SARAN
GARHWAL
TEHRI
DEHRADUN
SAHARANPUR
ALMORA
NAINI TAL
MUZAFFARNAGAR
BIJNOR
Nagina
MEERUT
MORADABAD
RAMPUR
PILIBHIT
Nawabganj
BAREILLY
BULANDSHAHR
Kalai
ALIGARH
BUDAUN
SHAHJAHANPUR
KHERI
Manjhra
ETAH
SITAPUR
BAHRAICH
Mathurikund
Jachunda
MUTTRA
HARDOI
FARRUKHABAD
MAINPURI
AGRA
Bichpuri
ETAWAH
GONDA
BASTI
GORAKHPUR
BARABANKI
FYZABAD
LUCKNOW
UNAO
CAWNPORE
Kalyanpur
RAE BARELI
Naugawan
SULTANPUR
AZAMGARH
JALAUN
PARTABGARH
BALLIA
FATEHPUR
JAUNPUR
GHAZIPUR
HAMIRPUR
ALLAHABAD
BENARES STATE
BENARES
JHANSI
BANDA
Atarra
MIRZAPUR
BENARES STATE

THE UNITED PROVINCES

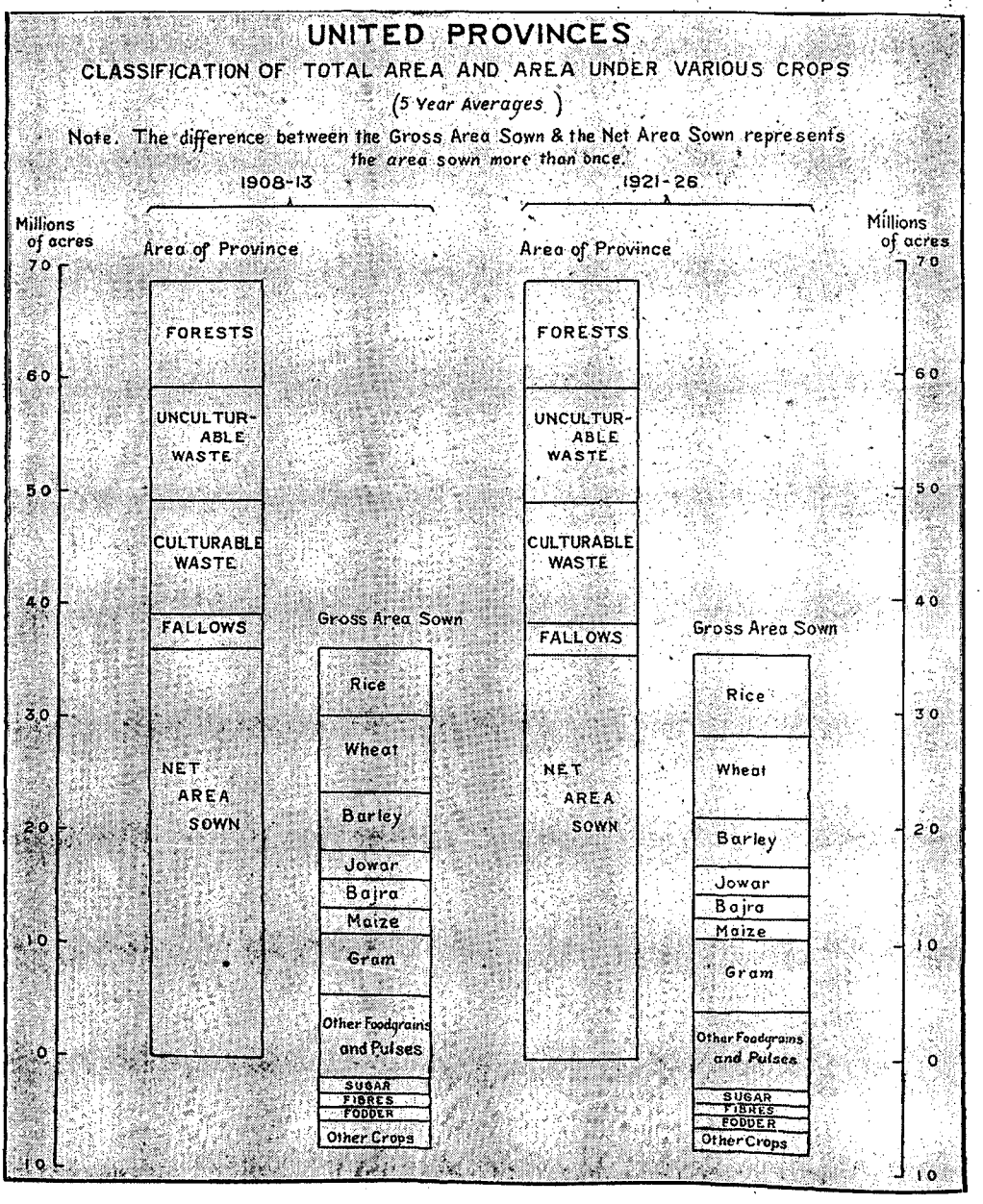
1. GENERAL FEATURES.

The United Provinces cover, in all, an area of 72·6 million acres and in 1921 had a population of 46·5 million persons. Deducting 4·3 million acres from the area and 1·1 million persons from the figure for population on account of the three States of Rampur, Tehri-Garhwal and Benares, the area of the territory under direct British administration is 68·3 million acres, with a population, according to the census of 1921, of 45·4 million persons. Lands either absolutely barren or otherwise not available for cultivation take up 10 million acres and forests another 9 millions. The area at present cultivated is about 35 million acres; and three million acres are under current fallows. The total quantity of land available for extending cultivation in the future is thus about ten million acres. The possibility of any considerable expansion is, however, limited. In the Indo-Gangetic plain, there is very little land that is not already under the plough. In Bundelkhand, the soil is thin and poor, the level of sub-soil water low and rainfall very precarious. In the country lying at the foot of the Himalayas and extending from Saharanpur in the west to Gorakhpur in the east, the areas of uncultivated land at present under jungle grass or forests are unhealthy on account of malaria and in the absence of heavy expenditure on sanitation, successful agriculture cannot be carried on. The reclamation of land, lying in patches here and there all over the plains and impregnated with salts to such an extent that crops cannot grow on it, is again chiefly a matter of expenditure. The outlook for a considerable increase of the area cultivated at present is thus not very encouraging.

Of a total population of over 45 million persons, 34·8 millions directly depend upon agriculture for their livelihood, 29 millions as tenants, or as cultivating proprietors depending mainly on their cultivation, four millions as agricultural labourers, one million as landlords, agents, clerks, etc., and three-fourths of a million as stock breeders and herdsmen. There are no large scale enterprises on the western factory system, using modern machinery and producing for distant markets in the province, apart from a few concerns mostly concentrated in Cawnpore and Agra. The province is thus predominantly agricultural,—in appearance, in outlook, and in distribution of population according to occupations and localities. A railway journey through any part of it reveals a vast expanse of unenclosed cultivation, field upon field, with innumerable mud villages and hamlets. When people come together, conversation centres round crops, prices of foodstuffs, rain and the weather. As regards distribution of the population, the census figures show strikingly its agricultural character. Of every thousand persons enumerated, 894 were rural and 106 urban. Classified according to occupations, 768 out of every thousand depend directly upon agriculture for their livelihood. If the crops are good, there is more to be transported, more to be bought and sold and more available for the services rendered by the village artisans, the priests and men of law.

For such a population the chief physical factors that determine its prosperity are the nature of the soil and the agricultural water supply available. Soils will be discussed later. In this general sketch of the chief features of the province, the question of water, which is the life of agriculture in a hot country, must be briefly touched upon. Rainfall obviously is of the greatest importance in a consideration of the water supply. The province depends almost entirely upon the monsoon for the growing of the *kharif* crops. Sugarcane is on the ground in the hot dry weather from April to June and for it irrigation is therefore essential. In a normal year, the *rabi* is for the most part sown without irrigation by conserving the moisture in the soil through careful tillage, but, in years of deficient rainfall, the more valuable *rabi* crops are sown after irrigation and several waterings are necessary to bring those crops to maturity in the greater part of the provinces.

The replenishment of the supply of sub-soil water depends entirely on the monsoon except in small areas adjacent to the irrigation canals and the main source of *rabi* irrigation is this subsoil supply which is tapped by means of wells of different designs. The incidence of rainfall varies. The largest amount is received in the north, the mountainous region of the Himalayas, where most of it runs to waste either in the rivers or reappears in the tracts bordering on the foot hills of the Himalayas, to produce malaria and rank jungle vegetation. In the Indo-Gangetic plain, the incidence of rainfall increases from west to east. This variation from west to east is a marked feature of the provincial climate. In this connection it is interesting to note that density of population also increases from west to east, showing the correlation of rainfall and density of population. A few figures may be given in illustration. The normal rainfall of Muttra is 23·42 inches and the mean density of the rural population 350; Agra receives 25 inches and its density is 372. Cawnpore, with a rainfall of 31·99 inches, has a density of 392. Fatehpur with 35·06 inches has a density of 397·3. Allahabad with 37·28 inches has a density of 428. Barabanki shows a rainfall of 39 inches and a density of 585·5 and Gorakhpur a normal of 48·30 inches of rain and a density of 690 persons to the square mile. The bulk of the rainfall is concentrated in the monsoon season, from the end of June to the end of September, and only a few light showers, not more than one or two inches, are received in the cold weather. As regards means of irrigation, canals and wells play a very important part in the agricultural economy of the province. The area served by wells in 1924-25 was over 4·3 million acres and in 1926-27, 5·38 million acres. The area irrigated by canals was nearly 2 million acres in 1924-25 and 2·46 million acres in 1926-27. In the Indo-Gangetic plain, wells are not difficult to make, as the water table is not deep down and wells consequently play a very important part in irrigational facilities. Bundelkhand, on the other hand, is a tract of precarious rainfall and a precarious underground supply of water, with a severe climate and an unresponsive soil. Its agriculture is consequently also precarious and the tract as a whole is not a flourishing part of the country.



To face page 381

Large estates are a feature of parts of the province. The landlords of Oudh, known as talukdars, own more than half of Oudh. In Agra, they are known as zamindars. The large landowners do little farming on their own account. Apart from these large landowners, who are relatively few in number, the province is, in the main, a province of small proprietors. The land revenue is temporarily settled all over the province except in the Benares division, part of the Azamgarh district, and a few estates in Oudh, which are permanently settled. The holdings are small and scattered; they are on the average larger in the west than in the east but there has been no detailed analysis of the size of holdings in the different areas. Illiteracy among the rural population is general. There is no cohesion or organisation either among cultivators or agricultural labourers. The failure of the co-operative movement in the United Provinces is to a large extent due to this factor of illiteracy. The peasants have not supported that movement, largely because their ignorance has prevented them from appreciating its advantages. There is now considerable security of tenure. Occupancy tenants in Agra with heritable rights hold 50 per cent of the total holdings area and statutory or life tenants hold 21 per cent; non-occupancy tenants-at-will hold only 2 per cent. In Oudh statutory tenants hold 64 per cent of the total holdings area. The tenants pay their rents in cash. Only a very small portion of the cultivated area, 3·9 per cent in Agra and 10 per cent in Oudh, was under grain rents in 1924-25.

The normal acreage of the principal crops is as follows: rice, 7·3 million acres, chiefly in the eastern and sub-montane districts; wheat, 6·9 million acres, chiefly in the western districts and Rohilkhand; barley, 4·9 million acres; gram, 5·7 million acres; *juar*, 2·5 million acres; maize and *bajra*, 2 million acres each; sugarcane, 1·2 million acres, with the Fyzabad, Gorakhpur and Rohilkhand divisions as the chief tracts. More than half the total area under sugarcane in India lies in the United Provinces. Cotton with 1·1 million acres is grown chiefly in the dry western tracts. The gross area sown in the United Provinces amounted to 43·5 millions and the area sown more than once to 8·5 million acres, showing the net area cultivated to be 35 million acres.

A quinquennial census of cattle has been taken since 1899. According to the figures for 1925, there were 10·1 million bullocks, 6·1 million cows, and 6·1 million young stock. The numbers of she-buffaloes and young stock were 4 and 3·5 millions respectively. Both sheep and goats were numerous, their respective numbers being 2·1 and 7·4 millions. There were 212 thousand horses; 197 thousand mares; 279 thousand donkeys and 24 thousand camels. The total number of ploughs was about 5 millions and of carts one hundred thousand. Practically all the heavy work of the country, ploughing, raising water from wells, threshing grain and carrying produce is done by bullocks. The cattle of the province are mixed. Pure breeds are few. There are two great breeding grounds in the provinces, Bundelkhand in the south and

the sub-montane districts in the north. The principal cattle fairs held are those of Batesar, Kakora, Makanpur and Dadri. Batesar is one of the main sources from which the province obtains superior cattle. Kakora serves to distribute the cattle bred along the Ganges ; Makanpur supplies the south of Oudh and the Allahabad division, while Dadri caters for the Benares division and Azamgarh.

2. NATURAL DIVISIONS.

The United Provinces fall into four well-defined agricultural tracts, *viz.*, the Himalayan or montane tract ; the sub-montane tract ; the Indo-Gangetic plain ; and the trans-Jumna tract, known as Bundelkhand, combined with Mirzapur. The characteristics of each tract are briefly treated below.

The montane tract.—This tract comprises 14 per cent of the provincial area and 3·30 per cent of the population and includes practically the whole of the Almora and Garhwal districts, the hill *pattis** of Naini Tal and the Chakrata tehsil of Dehra Dun district. It is mountainous and largely under forests and from the point of view of agriculture, is not of any great importance. Cultivation is confined to the lower hill tops, the terraced slopes and the alluvial land where the valleys widen out. The cropped area is small. Altitude and temperature are the factors which determine the type of agriculture practised. The chief crops are wheat, rice and *mandua* (*Eleusine coracana*). Ordinarily, each village endeavours to feed itself from its grain crops and to produce something for sale ; its market crop must as a rule be of small bulk in order to bear the cost of carriage and is usually a spice such as red pepper. In accessible places, potatoes are largely grown and there would seem to be considerable scope for producing fruit and vegetables for the markets of the plains. The first essential in any attempt to increase the slender resources of these sturdy hillmen is improvement of communications, chiefly roads. Only then can there be a brisk exchange of goods between the mountains and the plains at little cost. The hill cattle, though well adapted to the kind of work required of them, could also be made to yield much more profit to their owners, if their milking capacity were increased. There is no dearth of fodder and grazing facilities and since there are definite limitations to increasing the cultivated area, it would appear natural to depend more on cattle than on crops for an increase of income. The people are hardy and capable of great physical exertion. They make good use of their spare time by working as carriers of persons and loads. Lately they have taken to military service and in endurance and courage the Garhwalis have shown themselves to be excellent soldiers.

The sub-montane tract.—The soils of this tract and those of the Indo-Gangetic plain are alike as they have a common origin. In the northern portions of the districts, there is an excess of rainfall and moisture ; in the southern portions, the conditions approximate to those prevailing in the

* Subdivisions.

Gangetic plain. As the administrative districts cannot be split up and portions assigned to the sub-montane tract and portions to the Indo-Gangetic plain, they are included, for purposes of convenience, in their entirety in the sub-montane tract. Bearing this in mind, we may indicate broadly the boundaries of the area. It is bounded on the north-east by the foot hills of the Himalayas and the Nepal Tarai. On the south-western side, as stated above, the boundary line is ill-defined but a line drawn parallel to the foot hills of the Himalayas and the Nepal Tarai frontier and roughly forty miles distant from them would indicate the south western limit. The tract stretches from Saharanpur to Gorakhpur and includes 21·50 per cent of the area and 25·90 per cent of the population of the province. It consists of the following administrative areas : Saharanpur, Bijnor, Bareilly, Pilibhit, part of Dehra Dun and Naini Tal, Kheri, Bahraich, Gonda, Basti and Gorakhpur. The tract has a million acres under forest. Irrigation for the *rabi* crop is unnecessary in certain parts on account of the moisture. The abundance of water, however, breeds malaria and cultivation suffers in consequence from shortage of labour. The Bhabar* and Tarai* in particular are not prosperous. The Bhabar, a strip of country about twenty miles in width and gradually narrowing towards the east, consists of a stony slope covered by a thin layer of soil and has been brought under cultivation to relieve the pressure on the hill *pattis*. Beyond the Bhabar lies the Tarai. Both these tracts are fever-ridden. Hill-men come down into the Bhabar to sow after the rains and, after harvesting the crops, they retire to the hills to escape the ravages of malaria. Cultivation of the Tarai is done by cultivators who come in from the adjoining districts in the plains. In other parts of the tract, conditions are much better, the cultivated area is steadily increasing and the population is fairly dense and prosperous, the density varying from 400 in the west to 720 persons per square mile in Gorakhpur. The soils commonly met with are *bhur* or sand, *domat* or loam and *matiyar* or clay.

One of the features of this area is the abundance of grazing facilities throughout the year. The cattle raised in this tract are small, hardy and very active and are in great demand among cultivators especially in the rice growing areas. Where roads are bad, they are largely used for light bullock carts. Some large herds are kept by professional breeders. During the rains when conditions are unfavourable both for men and cattle, the animals are moved westward. The most valuable crops are rice and sugarcane. Holdings are small, especially in the east. Malaria is the problem of the more moist parts of this tract. The people speak various dialects of Western and Eastern Hindi and Central Pahari. Hindustani is, however, understood everywhere.

The Indo-Gangetic plain.—This tract, popularly known as Hindustan and from remote antiquity celebrated in religious lore and history for its fertility, its sacred streams and flourishing cities, imparting the stamp of its civilisation, institutions, and religious beliefs to the rest of India and drawing upon itself the cupidity of invaders, foreign as well as

*The words mean respectively 'porous' and 'moist'.

native, is even at the present day one of the most fertile regions to be found anywhere in India. Taken as a whole, it represents provincial agriculture at its highest and is the most densely populated portion of the tracts under consideration, the density of some of the eastern districts being unparalleled in any rural tracts outside China. Its area and population are 50·70 and 64·60 per cent of the total provincial area and population respectively. Geographically it includes portions of Rohilkhand; most of Oudh, south of the Gogra; the Benares division, north of the Ganges; the districts of Muttra and Agra and the whole of the Ganges-Jumna *doab**. The latter has three sections, upper, middle and lower. The upper section, extending from Saharanpur to Aligarh, and including within itself 22·50 per cent and 26·80 per cent of the total provincial area and population, is the most fertile; the middle section stretches from Aligarh to Cawnpore, and accounts for 21·20 per cent of area and 26·30 per cent of the population of the province. Its soil is not so fertile as that of the upper section but it is comparatively well-cultivated, prosperous and populous. The lower section, from Cawnpore to Allahabad, situated at the junction of the Ganges and the Jumna is the least fertile portion of the *doab*. Its area and population are 7 per cent and 11·50 per cent of the provincial totals.

The soils of the Indo-Gangetic plain are alluvial. There are considerable areas cut up by ravines and rivers. By far the greatest part of the plain comes under one of three classes: *bhur* or sandy soil, *matiyar* or clay and *domat* or loam. The lowlying moist areas near the rivers are commonly known as *khadir* or *diara*. The range of density is from 500 persons to the square mile in the west to 900 persons in the east and rainfall increases from west to east. Except for twenty thousand acres of afforested area, there are no forests. Irrigation is necessary for the *rabi* and sometimes for the *kharif* also. The tract is well served by canals; wells, however, irrigate a much larger area and play a very important part in its agricultural economy. The standard of cultivation is highest in the western and northern districts. Holdings there are also larger. The sturdy Jats of the west working with their women, can make the most intractable soil yield abundant harvests. The Kurmis and Kachis, the Ahirs, Gujars, Pasis and Lodhas are also excellent cultivators. The people have an innate kindliness of heart, are gentle and law-abiding. Throughout their history they have experienced vicissitudes of fortune but nothing has broken their spirit. Like their *dhub* grass they have clung to the soil and have always re-arisen after every calamity, inflicted on them by nature or man.

The trans-Jumna tract and the district of Mirzapur.—The four districts of Jhansi, Jalaun, Hamirpur and Banda, collectively known as British Bundelkhand, the district of Mirzapur and the part of the Allahabad district south of the Jumna account for 13·80 per cent of area and 6·20 per cent of the population of the province. The southern portion of Mirzapur is a wilderness of hill and valley and the northern a bare table land containing also a small strip of the great plain. The population

* Literally "two rivers." The term is used for "land lying between two rivers."

is scanty, the soil poor and the district at the mercy of the rainfall. In British Bundelkhand, there are two distinct belts of soil to be seen, the red formed from the weathering of the rock lying a few inches below and the black, which appears to be water-borne, its origin being not the Himalayas but the hills of Central India. The red soil is thin and poor and cannot hold water. The *rabi* crop is only sown in small areas usually below the embankment of a tank and is irrigated either from the tank or from wells. Elsewhere inferior millet is the utmost that this soil can bear and even that not continuously. It has to remain fallow after every two or three years to recuperate. The black soil has four types: *mar*, very dark and friable; *kabar*, a little less dark than *mar* and a good deal stiffer; *parwa*, a light yellowish loam, and *rakar*, consisting of bare, denuded slopes easily passing into ravine-land and growing only the most inferior crops. Only *parwa* resembles the soils of the Gangetic plain in its behaviour towards water, where it is available. The better types of *mar* are fertile soils and easy to work though not responsive to irrigation. Inferior *mar* and *kabar* are difficult soils to work. A slight excess or deficiency dislocates completely their preparation. Since they are retentive of moisture, a few inches of rain beyond the normal turns them into a sticky mass, rendering impossible the preparation of a seed bed for the *rabi*, and a few inches less reduces ploughing into an operation of drawing mathematical straight lines. So much for the *rabi* crop. As regards the *kharif* crop, again a slight excess or deficiency may result in its rotting or shrivelling up. The normal amount is rarely received and it is the abnormal that strikes at the fortunes of the people. Wells are few, except in limited areas near storage tanks, where there are groups of wells worked by Persian wheels. The depth to water is, in general, great, the sub-soil rocky for the most part and the construction of wells is, therefore, a difficult and costly operation. The only canal irrigation is from storage reservoirs formed by damming the Betwa, Dhasan and Ken rivers. Elsewhere, irrigation depends upon storing rainfall in tanks which also raise the water level in their neighbourhood sufficiently to facilitate the construction of wells.

The people have to struggle constantly against adversity with scanty resources. Holdings are large, and tenants are not in the grip of the landowners. If the conditions appear unreasonable to them, they throw up their holdings and find others at no great distance.

There is a sufficiency of grazing grounds but the cattle are not specially noted for their excellence.

The crops grown in the red soil are usually the inferior millets and pulses. The darker soils give good crops of the better millets in favourable years. Of the *rabi* crops, gram is the main crop and little wheat is grown. Little sugarcane and cotton is now grown and artificial dyes have abolished the cultivation of *al* (*Morinda citrifolia*), a lucrative crop formerly grown for dyeing purposes.

The tract has suffered heavily in the past. The resources of the people have been strengthened considerably during the last thirty years by the

provision of irrigational facilities and loans, and the adoption of a considered policy of land revenue remissions and of a land revenue assessment varying with the area cultivated. Much, however, remains to be done if Bundelkhand is to attain to a real measure of economic security.

3. PROVINCIAL INCOME AND EXPENDITURE.

It is not intended to discuss in detail the figures of provincial income and expenditure. One or two features of general interest, however, deserve to be noticed. The United Provinces have not, like the Punjab and Sind, been amply endowed by nature with unoccupied areas of good cultivable land at the disposal of Government. There is not much Crown waste available for development. Few buyers would look at the little that there is. The provincial purse cannot therefore be filled, from time to time, by the sale of such land. Further, there can be no additions to the annual provincial income, by way of land revenue, from the development of such lands. The lands of the United Provinces are more or less taken up. The annual income of the people may be reduced by the destructive interference of nature. Collective effort, however, is being directed towards reducing such losses to a minimum by strengthening the resources of the people in their fight against nature. Apart from such occasional interferences, there is reason to suppose that the national dividend is increasing. Not, however, that portion of it which is allotted to the community organised as a State. Taking first the most important source of provincial revenue, the term for which the land is settled has been extended from thirty to forty years; the percentage of the share taken by the State, as pointed out in another section, has been reduced. The water rates are rigid. The revenue from excise may fall. Stamps must bear some relation to the cost and value of the services rendered. It would thus appear that, in the existing arrangements, inelasticity is the word written across that side of the statement which deals with provincial income.

REVENUE AND EXPENDITURE CHARGED TO REVENUE

GOVERNMENT OF THE

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue ..	681	680	692	671	690	688
Excise ..	149	141	131	131	133	131
Stamps ..	151	161	175	174	176	169
Forests ..	86	84	74	69	64	58
Other heads ..	38	12	12	13	14	13
Railways :						
Subsidised Companies ..	1	1	2	2	2	1
Irrigation ..	93	86	99	66	85	99
Debt Interest ..	15	22	18	18	13	9
Civil Administration—						
Administration of Justice ..	9	10	12	13	14	14
Jails and Convict settlements ..	5	4	5	5	7	8
Police ..	2	5	3	3	3	3
Education ..	7	9	10	10	10	11
Medical ..	1	1	1	1	1	1
Public Health ..	1	1	2	1	1	2
Agriculture (including Co-operation and Veterinary) ..	5	5	5	5	5	5
Industries ..	..	..	..	2	1	1
Other departments ..	1	1	1	1	1	1
Civil works ..	5	5	5	6	4	4
Miscellaneous ..	14	20	24	47	46	41
Miscellaneous adjustments between Central and Provincial Governments ..	..	..	..	2	1	..
Extraordinary Receipts ..	..	..	..	..	..	31
Total, Revenue Receipts ..	1,264	1,248	1,271	1,240	1,271	1,290

UNITED PROVINCES

lakhs of rupees)

charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Expenditure charged to Revenue						
Direct Demands on the Revenue—						
Land Revenue ..	78	78	81	80	82	86
Forests ..	73	62	44	38	38	34
Other heads ..	16	15	16	14	23	21
Irrigation—						
Revenue Account ..	47	50	56	64	72	75
Irrigation—						
Capital Account charged to Revenue ..	5	3	3	2	4	6
Debt services ..	42	33	30	30	33	41
Civil Administration—						
General Administration ..	141	141	134	136	137	142
Administration of Justice ..	67	68	70	72	74	77
Jails and Convict settlements ..	37	39	31	30	35	38
Police ..	184	176	162	164	166	169
Education ..	153	139	160	172	187	189
Medical ..	24	26	25	26	31	35
Public Health ..	29	14	13	17	46	23
Agriculture (including Co-operation and Veterinary) ..	28	26	24	24	27	31
Industries ..	9	9	11	10	11	12
Other departments ..	2	3	4	3	1	1
Civil Works ..	104	79	75	82	71	69
Miscellaneous ..	111	110	108	79	79	85
Provincial Contributions ..	262	240	240	240	184	151
Miscellaneous adjustments between Central and Provincial Governments ..	..	2	..	1	..	.
Total, Expenditure charged to Revenue ..	1,412	1,313	1,287	1,284	1,301	1,285

GOVERNMENT OF THE

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Receipts						
Revenue Surplus ..	..	..	..	..	..	5
Permanent Debt incurred ..	419	1	..	..	..	..
Famine Insurance Fund ..	32	33	39	4	17	74
Loans and Advances ..	64	81	371	67	19	15
Deposits of Sinking Funds for Provincial Loans ..	..	3	..	..	..	..
Advances by Central Governments ..	23	..	104	..	..	..
Advances from Provincial Loans Fund ..	..	..	..	149	200	227
Appropriation for reduction or avoidance of Debt ..	..	..	6	5	4	4
Total, Capital Receipts ..	538	118	520	225	240	275
Opening Balance ..	89	302	141	145	75	53
Total ..	627	420	661	370	315	328

UNITED PROVINCES

lakhs of rupees)

and Expenditure

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Capital Expenditure						
Revenue Deficit ..	148	65	16	44	30	..
Forest Capital outlay ..	3	1	..	2	3	1
Construction of Irrigation Works ..	46	57	103	118	119	131
Outlay on Agricultural Improvements ..	..	..	..	1	..	2
Other Capital outlay ..	..	..	..	2	—2	..
Famine Insurance Fund ..	..	8	6	46	36	34
Loans and Advances by Provincial Government ..	70	77	346	45	15	25
Sinking Fund Investment Account ..	..	3	6	3	6	4
Advances by Central Government ..	48	25	25	25	25	26
Civil Works not charged to Revenue ..	3	14	6	6	58	50
Other Capital Expenditure ..	7	29	8	3	—28	6
Discount on Loans (U. P Development Loan) ..	..	..	..	..	..	29
Total, Capital Expenditure ..	325	279	516	295	262	308
Closing Balance ..	302	141	145	75	53	20
Total ..	627	420	661	370	315	328

4. REVENUE ADMINISTRATION AND LAND RECORDS.

By revenue administration is meant the administration of land revenue. It is proposed to consider in this section the principles underlying the question of its determination and to give a sketch of the agency employed for its collection. In official parlance in India, determination of the amount is effected periodically by a procedure known as the "Settlement." Before discussing this, it is necessary to give an account of the system of land records, as they supply the data which are of great help in expediting settlement work.

The elaborate system of land records rests on a humble official known as the *patwari*, or the village accountant. He resides in a village, draws a small salary and prepares, and has the charge of, the records of a village or group of villages, the number varying with the area cultivated. His important papers are, (i) the map of the village lands, (ii) the *khasera* or field book, (iii) the *khatauni* or the register of cultivating rights, (iv) the *jamabandi* or record of rents demanded by the landlord and payments of rent received by him from the tenant. He measures the village lands with the help of a chain, a right angle and a compass and reproduces his measurements on a map showing the boundaries of the village and the fields with their numbers. All alterations in boundaries which are necessitated by a division or sale of land are continuously noted by him and incorporated in the map. The map gives a bird's eye view of the fields. Detailed information about the area of each field, the name of the cultivator, the rent, the method of irrigation, the number of wells, the irrigated and unirrigated area under each crop are given in his *khasera* or field book. This is the source from which he prepares his other statistical registers, *e.g.*, the *khatauni* or register of cultivating rights, and the *jamabandi* or rent roll. Besides these permanent records, the *patwari* has to prepare seasonal crop statements known as the *kharif*, the *rabi*, the *zaid* or extra crop, and the area statements. The object of these statements is to acquaint the higher authorities with any changes that may be taking place in the total cultivated area, the area sown, the kind of crops grown and their condition, the proportions of the irrigated and unirrigated area under each crop in each season, the number of wells, the nature of the season—all details, as a matter of fact, which throw light on the state of cultivation. At the tehsil headquarters, the statistical information supplied by the *patwari* is compiled, abstracted and abbreviated into registers arranged according to villages, groups of villages, known as parganas, and then for the tehsil as a whole. These registers are written up year by year and constitute a permanent record of great statistical value.

The seasonal statements forwarded from the different tehsils to the district headquarters are consolidated into a statement for the whole district and then sent to the Director of Land Records. The staff of the Director compares these statements with those for the previous years, asks for explanation of any marked changes and splits up areas under a mixture of crops according to conventional formulæ accepted

by the department. The information is then taken down in permanent registers and also published every year in reports known as the " Season and Crop " reports.

It will be seen from the above account that the whole pile of records, both seasonal statements, and those of a more permanent character showing rights of ownership and cultivation of the lands of a village rests on the *patwari*. His work is examined and checked, not only by his immediate superior, the *kanungo*, but also by officers of the revenue establishment in charge of the tehsil. The naib tahsildar and the tahsildar send for the *patwari* constantly and also go out into their administrative charges to verify the information on the spot. Their work in turn is checked by the subdivisional officer who is a member of the Indian Civil Service or of the Provincial Civil Service. He is stationed at the headquarters town of the district, but has to move out every now and then for carrying out his duties of inspection and supervision. The Collector receives reports from and checks the work of his lieutenants, the subdivisional officers, He also goes out into the district to the fountain of information. viz., the *patwari*. There is nothing which the latter does not know, nothing for which he has not an explanation. He is the ultimate source of all official information relating to land and the entries made by him are valuable evidence, and often the only real evidence, in case of disputed rights. This humble individual, with his bundle of papers, is the very spirit of obedience and of detail and very often entries made by him come up in a law suit before the Privy Council.

The determination of the amount payable by owners as land revenue is carried out by an officer known as the " Settlement Officer " who is detailed for this duty in each district coming under settlement and who may be a member of the Indian Civil Service or of the Provincial Service of deputy collectors. In any one year there may be a number of districts falling due for settlement. Settlement is usually preceded by a revision of records, for which work the settlement officer is also gazetted as record officer. The revision of the records and the overhauling of the village map is the first preliminary operation. This work is done under the supervision of a deputy collector. In settlement operations proper, the settlement officer joins the district when this work has been completed for part of the area and he then inspects the villages for the purpose of classifying soils and villages. The soil classification is not an affair of test tubes, retorts and the microscope, but a division into broad grades recognised by the people. Natural composition, facilities for irrigation, nearness to the village or to a town are all factors which are taken into consideration in fixing the classification. The settlement officer then proceeds to plan out his rental or assessment circles formed of villages possessing a general similarity of soil or physical character or rent paying capacity. The next stage is the most difficult part of his work, *viz.*, the determination of the standard rates of rent for each category of soil. These rates are based on the actual rentals of each circle, but, in working them out,

he omits from the calculations those rentals which he finds to be either excessive and unstable having regard to the general standard of the village, not genuine owing to the exclusion of premia or other reasons, or inadequate as being materially below what the landlord could at once claim under the Land Revenue or Tenancy Acts. In Oudh, the standard rates are based on the "genuine, adequate and stable rents which are paid by substantial tenants of average skill and industry, who depend for their livelihood on the produce of their holdings." In the province of Agra, on account of the existence of occupancy and statutory tenants and of the passing, in 1926, of a new Tenancy Act, the position is a little complicated. In general two sets of circle rates have to be calculated, one set for occupancy tenants and the other for statutory tenants, the rate for the former being as a rule considerably below that for the latter.

The difference is due to the fact that occupancy rents have been controlled for many years and are now much below economic rents, while statutory rents have only been brought under control by the new Tenancy Act and are, therefore, still competition rents.

Under the rules, standard rates for occupancy tenants must be based on rates which have proved themselves stable and suitable for this class of tenants. They are fixed with special regard to the rates paid by tenants whose period of tenure is twenty years but the rates paid by old occupancy tenants and by tenants of twelve years' standing are also taken into consideration. Circle rates for statutory tenants are determined on the same principles as in Oudh.

The next step is to calculate the gross assets of each *mahal* or area for which a separate land revenue engagement is taken. The area assessed is that which is found by the settlement officer to be the normal cultivated area, having regard to the fluctuations which occur in a series of good or bad seasons. Certain areas are exempt from assessment. These include: (1) land occupied by buildings with their appurtenances which has hitherto not paid revenue; (2) permanent threshing floors; (3) grazing grounds from which no rent or grazing fees are derived; (4) market and village sites which have hitherto not paid revenue; (5) permanent roads and pathways; (6) such other lands as are not ordinarily used for cultivation and yield no income; and (7) old fallow or land which has been out of cultivation for more than three years.

The gross assets of a *mahal* consist of the accepted rental of the cash-rented area, together with a valuation at standard occupancy rates of proprietary cultivation and of the other areas not paying cash rents together with an estimate of the receipts from manorial dues of an agricultural character such as the sale of grass. Assessment on prospective assets is forbidden.

Next, certain abatements and deductions have to be made. As regards cash rentals, the main abatement is an allowance on account of the caste privileges of certain castes in applying the standard rates to lands held by them. This allowance is practically confined to Oudh as in Agra the

low rates for occupancy tenants give a more than equivalent concession. In valuing proprietary cultivation, a deduction is made of from fifteen to twenty-five per cent according to the circumstances of the zamindars. For improvements such as the sinking of wells and making of embankments within thirty years of settlement an allowance is made, either by deducting ten per cent of the estimated cost of the improvement or by valuing the area benefiting from it at the rates which would have been applied if the improvement had not been made. The net assets having thus been determined, the assessment of land revenue is made. The percentage taken by the State in recent settlements has been between forty-five and forty-three of the net assets. At the beginning of the nineteenth century it was ninety, eighty-three in 1822, sixty-six in 1833, fifty in 1855.

A Bill was introduced providing for fixing the general standard of asssessment at forty per cent and for limiting the enhancements in any *mahal* to thirty-three per cent. It failed to pass the Legislative Council but rules to the same effect have been brought into force. The term of settlement has hitherto been thirty years, but will now be forty years.

For revenue purposes the unit is a *mahal*, which means the area for which a separate agreement to pay the land revenue is taken. A *mahal* may be a single village, part of a village or a number of villages. Revenue is collected and paid by a representative of the co-sharers of a *mahal*, called the *lambardar*. In the eastern districts, individual co-sharers pay the land revenue direct.

The Collector and his staff of revenue officials keep the collections close to the amount demanded in normal years. Remissions, or, in the less serious cases, suspensions, are granted for total or partial failure of crops.

Restrictions on the sale and transfer of land exist in the whole of Bundelkhand, and in parts of the districts of Etawah, Allahabad and Mirzapur.

5. THE CULTIVATOR.

The United Provinces with an agricultural population of thirty-five million people (or, counting five persons to a family, comprising seven million households) present many differences in natural conditions. The conditions prevalent in Bundelkhand are different from those in the alluvial plain ; the western part of the plain differs from the eastern and the province of Oudh from that of Agra. The mountainous region of the Himalayas has conditions and problems of its own. Apart from these differences due to natural conditions, there are the various interests connected with land of which account must be taken. For example, an analysis of the legal rights of six million people classed as tenants, making with their families thirty million persons reveals a great complexity of interests. Again, striking differences appear if the effort and skill in the cultivation of land are taken into account. This being the position, generalisations about the cultivator of the United Provinces have to be made with great

care and caution. They would have to be so hedged round with qualifications in their application to the circumstances of cultivators of any particular tract, that they would lose their character. Apart from these difficulties, there is the obstacle that the cultivator, typical of a tract or of the province as a whole, lies buried in the bundle of village papers kept by the *patwari*. One does not know how the cultivated area is distributed in holdings of various sizes nor the size of holding which is most numerous and typical. In the absence of such information, no estimate claiming the definiteness of a quantitative measurement of the economic position of the typical cultivator can be made. In the memoranda prepared for this Commission by various officers of the United Provinces Government, figures relating to the size of the average holding in the different districts have been given. The average holding is arrived at by dividing the cultivated area of a district by the number of households of agriculturists. The cultivated area is definitely known. As regards the number of families, they are found by dividing the agricultural population of a district by the divisor 5, which represents the average number of persons in a family. This figure for households is an estimate and depends upon certain assumptions. The average holding as estimated by the Revenue Department in the different districts is given in the Table below :—

	Average size of tenants' holding (in acres)		Average size of tenants' holding (in acres)
Sub-montane		*Central Doab*—contd.	
Pilibhit	6·5	Etawah	6·0
Kheri	6·8	Hardoi	5·6
Sitapur	6·8	Unao	4·7
Bahraich	6·6	Cawnpore	6·3
Gonda	5·3	Lucknow	4·9
Basti	4·0	Bara Banki	4·8
Gorakhpur	4·1	Rae Bareli	4·5
Upper Doab		Fatehpur	6·6
Saharanpur	10·4	*Eastern Doab*	
Bijnor	9·1	Fyzabad	4·2
Moradabad	6·7	Sultanpur	4·2
Muzzaffarnagar	11·5	Partabgarh	4·0
Meerut	8·7	Allahabad	5·7
Bulandshahr	7·9	Azamgarh	3·4
Aligarh	9·8	Jaunpur	3·5
Muttra	10·3	Benares	4·6
Agra	7·6	Ghazipur	4·9
Central Doab		Ballia	5·1
Bareilly	5·3	*Trans-Jumna*	
Budaun	5·7	Jhansi	11·7
Etah	6·5	Jalaun	12·4
Mainpuri	5·9	Hamirpur	11·9
Shahjahanpur	5·7	Banda	10·9
Farrukhabad	5·3	Mirzapur	5·0

It would appear from this Table that the size of the average holding is largest in the western districts, *e.g.*, Muzaffarnagar, Saharanpur and Muttra. In the central districts, holdings are of intermediate size. In the east, the size of the average holding shrinks to very small proportions, *e.g.*, 4·1 acres in Gorakhpur, 4·0 acres in Basti and 3·4 acres in Azamgarh. In the west, chiefly in the Meerut division, the average holding would consist of about forty per cent superior land with a good water supply and well-manured and sixty per cent inferior or unirrigated land. Of the latter, about one-third would be irrigated and manured, and the rest unirrigated and unmanured. In the east, *e.g.*, in the Gorakhpur division, about one-fifth of the typical holding would consist of single-cropped rice land, about one-fifth superior and three-fifths inferior land. In Lucknow, there would be rather less rice land and rather more loam. In the Jhansi division, conditions are peculiar. On account of the nature of the soil, a much smaller proportion of the land is utilised for the growing of crops and these are chiefly of an inferior type requiring little irrigation. The economic position of a cultivator depends not only upon the quantity of land he holds and its quality, but also upon the conditions attaching to his tenure. He may be (1) a proprietor, (2) an inferior proprietor, (3) a superior tenant, (4) an ordinary tenant, or (5) a sub-tenant. His rights vary according to the tenure on which he may be holding land. If he is a proprietor, he has no rent to pay but only land revenue to Government, which is moderate. His economic position as proprietor is strengthened by the legal rights which he possesses in land under his proprietary cultivation. They are of two kinds, *sir* and *khudkasht*. *Sir* land is the home farm or land which the landlord or co-sharer holds directly in his own management, either cultivating it himself, or by his farm servants or personal tenants. *Khudkasht* is also land cultivated by the proprietor for himself but for this he pays rent to the whole body of co-sharers. If the landlord or co-sharer loses his proprietary right in his *sir* land, as he may do in certain circumstances defined in the laws, he retains possession of it as an occupancy tenant, with a certain privilege as to reduced rental. The value to the cultivator of such a right is, therefore, that he cannot be without land to cultivate on favourable terms. It is not unreasonable to assume that, with a progressive reduction in the level of the land revenue, with no rent to pay to a superior landlord and with a steady rise in the price of agricultural produce, the peasant owner in the United Provinces is in a position of undoubted economic advantage.

A cultivator holding land as inferior proprietor may be an under-proprietor in Oudh or Agra, or a permanent tenure holder or a fixed rate tenant in the permanently settled districts, or a lease holder in Oudh. The point of importance in connection with these tenures is that the cultivator possesses under them a transferable right conferring absolute security of tenure. Subject to the payment of rent to a superior proprietor, a cultivator has full proprietary rights and his rent cannot be varied during the currency of a settlement after it has been determined by a settlement officer.

As a superior tenant, a cultivator may be an occupancy or an ex-proprietary tenant in Agra ; and in Oudh a privileged holder, an occupancy tenant, an ex-proprietary tenant, or holder of a heritable, but non-transferable, lease. About 53·1 per cent of the holdings area in Agra is held by these two classes of superior tenants. In Oudh the area held under these tenures is small and unimportant, being about 1·6 per cent only.

Both in Oudh and Agra the security of tenure enjoyed by tenants, of the categories mentioned above, is more or less complete. Their rents are controlled and rarely are they ejected for arrears of rent.

The majority of ordinary tenants in Oudh held on short leases previous to the passing of the Oudh Rent Amendment Act of 1921, when life tenancies were created. Similarly, in Agra, life tenancies were conferred by the passing of the Agra Tenancy Act in 1926. Before the enactment of these two great measures of agrarian reform, the security enjoyed by ordinary tenants both in Agra and Oudh was small and could rarely be obtained except by the payment of a heavy price, known as *nazrana*, for continuance of a tenancy. The policy of landowners in general was directed against the acquisition by tenants of rights of occupancy and so they had to change tenants or give fresh leases. In giving these leases they exacted the premium known as *nzzrana*. One consequence of this practice was that rents on which the land revenue is based were kept nominally low. In Agra, the non-occupancy tenant had no security and made no improvements. In Oudh, under the system of seven years' leases, the tenant on the better managed estates had in practice a fair degree of security and constructed a large number of wells, but he had no legal guarantee of security and depended entirely on the good will of the talukdar. No one takes the trouble to repair the roof of a caravanserai, in which shelter is enjoyed for a night only. Many landlords were also opposed to the sinking of wells as they gave rise to claims for compensation and thus interfered with their right of ejectment.

All this has now been changed. The statutory tenants in Oudh who held 66·4 per cent of the holdings area in 1924-25 and the ordinary tenants who had 22·9 per cent in Agra now enjoy security of tenure for their lives and their successors for five years after their death. The incentive to careful cultivation of land and the making of permanent improvements has now been provided in the shape of life tenancies and beneficial results are sure to follow in course of time.

The interest of the tenant in land revenue is only indirect. His concern is with the rent he pays. The striking fact about rents in the United Provinces is their gradual decrease in amount as we pass from west to east. Rents are rather low in the sub-montane districts, and very high in the Upper Doab, except in the trans-Jumna portion of Muttra and Agra, moderate in the central, and very low in the eastern portions of the Doab. Holdings are large in the western districts and the high rents per acre are due to a large extent to the large size of holdings.

In the sub-montane districts, except Gonda, Basti and Gorakhpur, holdings are large but rents are kept down by the relative scarcity of tenants and the unhealthiness of the tract. Some castes, *e.g.*, Brahmins and Thakurs in Oudh, by custom pay low rents.

The cultivators who till the land of the United Provinces belong to the following castes and tribes: Bhar, Bhoska, Jat, Kachhi, Kisan, Koeri, Kurmi, Lodha, Murao, Saini, Tharu and Meo. The graziers are represented by Ahars, Ahirs, Gadariyas, Gujars and Ghaddis. Agricultural labourers are drawn chiefly from the Chamars, Dhanuks, Dusadhs, Koris, Luniyas and Pasis. The landowners are Bhuinhars, Rajputs, Sainthwars and Tagas. There is no clear cut division in respect of all these classes. Members of the same caste or tribe very often are found in the category of landowners, tenants and labourers. The cultivating classes are, from the point of view of race, of mixed origin. The Aryan has blended with the aborigins and waves of later invaders have produced new complications. The majority of the cultivators are Hindu by faith. It is difficult to disentangle the various strands of the popular religion, but a few features, which have an important influence on practical morality, may be briefly noticed. For example, belief in the doctrine of Karma is universal. As a man sows, so shall he reap in another existence. The hill people believe in the power for evil of the ghost of injured persons. The effects of dying in debt are very much dreaded. These beliefs have an important influence in restraining people from wrong-doing and their practical result is seen in the fact that in the hills hardly any police are required. Both in the plains and in the hills, caste also has an important bearing in keeping people to right conduct. Fear of caste penalties acts as a powerful deterrent. The peasant is devout in observing religious ceremonies and rituals, performing pilgrimages, and bathing in the sacred rivers of the province. Veneration of the cow is entwined in the heartstrings of the peasant, but the cow derives little practical advantage from the existence of this excellent sentiment. The peasant receives little religious instruction. The book which has most influenced him is Tulsi Das's Ramayana, which he cannot read but knows from recitations, which he frequently listens to at night. The cultivator gives away a fair amount in charity and, considering his income, his expenditure on social and religious ceremonies is heavy. He frequents the law courts, also, but not willingly. Very often he is drawn into a law suit to defend his rights. There are such matters as ejectments, arrears and enhancements of rent, for which he is summoned and for which he has to pay. He understands little of the language or the argument or of the decision except the word "Dismissed". There are a number of dialects spoken in the provinces but the people with whom he comes into contact speak or write a language which to him is unintelligible. An amusing example of the style of language as used in books, newspapers and for oral instruction is given by Mr. (now Sir) Richard Burn in his Census Report of 1901. He quotes a passage from a High Hindi book which, with its Sanskrit verbiage, would be almost as intelligible to the peasant of the United Provinces as its

translation with the substitution of Latin for Sanskrit words would be to an English peasant. The original passage and its rendering into English with the appropriate stuffing of Latin are given below :

"*Parantu* us men ek *Kathinai* parti thi. *Manushya matra* ki *ganana* ki *apeksha* thori hi ganon ko yih yog tha ; is *karan* is chepka *bahudha abhaw* bana rahta tha."

Translation : "*Autem* there was a *difficultas* in this. *Visus* the *numerus* of the *humanum genus*, few cows had this disease (cow-pox) ; for this *ratio* there continued to be *magna paucitas* of this serum."

High Urdu shows similar absurdities. The natural ability of the peasant of Hindustan is bound to wither under the shade of such verbiage. No wonder the peasant's education has not gone far and he is not to blame if he discards this kind of education as soon as he comes out of the village school.

There is reason to believe that the standard of living is rising. There is no outward sign of change in the mud hut of the Indian cultivator ; he consumes the same kind of foodstuffs as before, but he is beginning to sell his *rabi* crops. The money so obtained is spent in paying his rent or revenue, in meeting the claims of the moneylender who finances him, and in buying with the surplus commodities of ordinary comfort and convenience ; *e.g.*, tea, cigarettes, matches, lanterns, buttons ; pocket knives, looking glasses, cotton cloth, foreign or Indian. The peasant indulges in railway travel also.

The household utensils inside the mud hut are not the same as they were, say, forty years ago. Brass and enamelled ware take the place of leaves and the pots made by the village potter. The chief feature of importance, however, is the sense of economic security which has come into his life. He is not so helpless as he was before. A continued rise in the standard of living depends upon two factors : an increase in purchasing power due to higher productivity and, secondly, some control in increase of numbers.

No definite answer can be given to the question whether ultimately the standard of living will break under the stress of population or whether some conscious check will be imposed for maintaining intact the standard of living.

6. THE AGRICULTURAL DEPARTMENT.

The United Provinces took the lead in establishing a provincial department of agriculture in 1875. The first model farm was started on rented land near Cawnpore in 1881 ; a school of agriculture was opened in 1893, also at Cawnpore, with the object of training teachers and revenue officials. The superior staff consisted of the Director of Agriculture with a deputy and an assistant up to 1905. The province was divided into two circles with Cawnpore and Partabgarh as centres, for purposes of administration. The collection of facts and figures rather than investigation and research constituted the main work of the department in its early days. The grant of a donation of Rs. 3 lakhs by the

Government of India enabled the department to expand its activities and to strengthen its personnel. An agricultural engineer was appointed in 1908. Between 1914 and 1918, rapid development was hindered by the exigencies of the great war. In the three years after the termination of hostilities, a number of officers were appointed to the Indian Agricultural Service. Research work was started in various new directions and many new farms were opened. Work in connection with cattle-breeding was made over to the Agricultural from the Veterinary Department. In 1920, the Agricultural Department, after its separation from that of Land Records, was placed under a Director chosen from the expert staff.

The organisation of the department at present is based on the division of the provinces into six circles, each in the charge of a deputy director. In a circle there are one or two officers of the United Provinces Agricultural Service, besides the field staff for demonstration work and managers of demonstration farms. The circle is a self-contained unit. The cattle-breeding work, extending over the entire provinces, is under an expert deputy director. Similarly, the engineering section embraces the whole of the provinces. Operations in connection with well-boring and installation of small power plants are carried on by an expert staff under the control of the agricultural engineer.

The ideals which the department has placed before itself are, firstly, to introduce improvements in the existing system of agriculture and, secondly, to develop, as far as possible, a better system. It seeks the attainment of these ideals by the following means: (*i*) organised research work; (*ii*) demonstration and propaganda; (*iii*) provision of agricultural education and (*iv*) assistance to the public.

Research is carried on by experts and also by officers in charge of circles.

Cotton was the first crop studied and work on it has been carried on along two definite lines (*i*) hybridisation and (*ii*) selection. Hybridisation seeks to evolve a plant combining the two desirable characters of high yield in lint and long staple.

It has been established generally that cottons capable of spinning the higher counts have a low ginning percentage and *vice versa* but recently varieties have been produced by hybridisation in the botanical section and are under trial on a fairly large scale on cultivators' fields which give a distinctly better staple (capable of spinning 10s-12s counts) than the indigenous cottons which have a high ginning percentage (38 to 40).

Experts are of opinion that this work has not yielded practical results as quickly as it was at one time hoped.

Selection work has yielded Aligarh 19 and JN 1. Aligarh 19, being most profitable to the ordinary cultivator is in great demand. It has a moderate staple, a good colour and a high ginning percentage. In the most important cotton tract of the United Provinces, *viz.*, the dry districts between Meerut and Fatehpur, along the course of the Jumna

this variety is rapidly displacing the inferior cottons grown hitherto. JN 1, which has a better staple than Aligarh 19, is spreading in the districts south of the Jumna.

The pink and spotted boll-worms have also claimed much attention. The pink is more destructive than the spotted boll-worm. Its ravages may reduce the value of a crop from 25 to 50 per cent. Experiments carried out by heating the seed to a temperature of 140° Fahrenheit and protecting the growing plant by means of wire cages have produced startling effects in coping with these pests.

Large experiments on the heat treatment of seed are being carried out on several controlled areas.

The sugarcane crop requires more detailed notice on account of its importance. The area normally put under this crop in the United Provinces is 1,200,000 acres, being about half of the total area in India. The crop is grown in a large belt of country, parallel to the Himalayas, which may be divided into three tracts, *viz.*, (*i*) the western, or Meerut; (*ii*) the central, or Bareilly and (*iii*) the eastern or Gorakhpur tract. The great bulk of the canes of the United Provinces are of the thin variety, either red or white in colour. They are reed-like, of medium height, have a hard rind and are very fibrous and hardy. They survive in climatic conditions fatal to canes of the medium and thick varieties. The red canes predominate in the Meerut tract and the white ones in the eastern districts. The central tract grows both varieties, red and white.

Medium canes require more careful cultivation and are more susceptible to damage by animals and to diseases such as red-rot and mosaic. The yield per acre is about fourteen tons of cane.

Thick cane, introduced from the tropics, is grown near large cities on account of the manure available from large centres of population. It is largely used for chewing. The area under this type is 75,000 acres and the yield per acre is about twenty tons of cane.

The crushing of canes is done in small two and three roller mills worked by bullocks. The manufacture of *gur* (solidified juice without having been purified) and *rab* (juice reduced to a stiff syrup) is a cottage industry.

The percentage of extraction of juice is poor and the strain on the animals heavy, the task being beyond their strength. The exhausting labour disables the animals for ploughing and other work connected with the proper preparation of the soil for the sowing of the *rabi* crops.

The questions before the Agricultural Department were firstly, to improve the quality of the canes; secondly, to evolve a small power plant for the proper crushing of the canes and so to relieve the cultivator's bullocks of the heavy strain, and, thirdly, to provide an economical and effective furnace for the preparation of the juice.

Agricultural research tackled the question of improvement of the cane and the skill of the mechanical engineer had to find a solution for the difficulties involved in the processes of manufacture.

Serious research on sugarcane dates from the year 1908. After four years of preparatory study, the agricultural chemist began work on the lines laid down by the Board of Agriculture in 1907, on a special farm, opened in 1912 in Shahjahanpur. His investigations showed that indigenous canes did not respond to good cultivation and high manuring.

It became necessary to import varieties of foreign canes for trial. Careful selection yielded valuable types, the chief of which are S/48, Uba, and Mauritius 16. These three varieties are now widely distributed and their cultivation to be profitable requires deeper tillage, regular watering and good manuring. Hybridisation work carried on at Coimbatore has also yielded valuable results and it is expected that this work will revolutionise the cane industry of northern India. These Coimbatore canes are of various types; some are suitable for intensive cultivation and others have been evolved for conditions in tracts in which cane-growing has not been successful.

A farm was established in the hills with a view to investigating the possibility of producing disease-free and vigorous seed for the plains. Later investigations indicate that deterioration was mainly due to mosaic disease and that the production of mosaic-free planting material can be carried out successfully in the plains.

Poor crushing is the result of lack of power. Many farms with oil engines for lifting of water for the purpose of irrigation are installing power-driven mills. The McGlashan furnace which enables boiling to keep pace with crushing is being extensively taken up. Its merits are that it boils the juice more quickly and consumes less fuel. In many areas in the United Provinces, oil engines, tube wells, pumping plant, and power-driven mills, now make up the equipment of a farm. An industrial atmosphere is beginning to pervade the countryside. The small holder has not benefited as yet from these modern appliances. It is hoped that co-operation, the cure for so many of the ills of the small man, will enable him to reap the advantage associated with improved processes and the use of mechanical power.

The normal area under wheat amounts to seven million acres. The crop needs thorough tillage, is sown in the latter part of October, and ripens in March or April. Three varieties of wheat have been introduced, (*i*) Muzaffarnagar; (*ii*) Pusa 12 and (*iii*) Pusa 4. The Pusa wheats are good yielders but since they are beardless, the ears shed the grain. The Muzaffarnagar variety is bearded but suffers from rust, particularly in Oudh and Rohilkhand. Cloudy weather in February produces the evil in the dry tracts also. Further research on wheat is necessary.

Research on rice was started only four years ago. The work of classification and separation of unit species is now proceeding. Chemical studies of the soil are also being made. Selection has yielded good results.

In 1923, a preliminary survey of castor and sesamum was undertaken. Investigation, in close association with the Technological Institute at Cawnpore, is directed towards separation of pure strains and

determining the quality, percentage and acidity of the oil. As regards linseed, the United Provinces require a variety which has a high yield and is also rust resistant.

Among fibres, an improved variety of *sann* hemp has given good results. Retting, on which depend the lustre and quality of the fibre, is also receiving attention. In the absence of large quantities of clean water, decortication has been proposed as an alternative, to save the colour of the fibre. Jute has now been established on thousands of acres in the districts of Kheri and Sitapur, where the climatic conditions approximate closely to those of Bengal.

The potato is becoming an unfailing companion of the *chupatti* (Indian bread). Investigation has shown that the rot which affects the potato when stored can be prevented by adopting cold storage.

The formation and loss of nitrates in the alluvium has also been studied and the accumulation of nitrates as the result of green manuring is being investigated. The process is most active in June and July and in October.

Usar land can be reclaimed at reasonable cost in the eastern districts. As regards the western dry tracts, the question is whether water can be more profitably used for the irrigation of good land or for flooding *usar* land and making it available for cultivation. As an alternative, raising of fuel and fodder opens out very good possibilities.

So much for investigation and research. Demonstration and propaganda take various forms. Considerable use is made of the annual district fairs, at which improved seeds, implements, pumping machines and other paraphernalia are displayed prominently and audiences of rustics are exhorted by lecturers. Conviction is carried home to them by actually growing the crops right under their eyes. The department is moving away from demonstration farms to demonstration plots, situated in the fields of the cultivators. The method consists in sending down an energetic and persuasive man who knows the rustic mind and the art of cultivation. He hires a plot, sows it with the improved seed, makes use of the improved methods of cultivation he wishes to introduce, interests the people in his work and leaves conviction to the harvest. The improvements are talked about and spread in the group of neighbouring villages. This is the group method of influencing the customary practices. Another procedure is to hire a plot, share expenses with the owner and divide the profits. This method makes zealous cultivators and ardent friends who have experienced the weight of extra profits in their pockets. In other cases, when the department is helping the more substantial man, the landholder undertakes to reserve a certain area for a term of years, as a condition of the subsidy which he receives from the department for sinking a tube well on his estate. The department gets the land free of cost, manages it as a demonstration farm and expects that it will influence the neighbouring cultivation. The next stage is reached when landholders come to the department for help and advice for starting similar farms themselves, thus creating further nuclei of influence.

By the provision of good seed from its own seed farms through its seed stores which numbered 148 in 1926-27, by drawing upon seed raised on private farms under supervision of the department and by making use of the methods of propaganda sketched above, the department has been able to put 750,000 acres under improved wheats and 200,000 acres under improved cottons. It is estimated that the extra profit has been Rs. 15 per acre from each of those improved varieties. The work of seed distribution now entails a heavy burden on the department.

Assistance to the public is given generously by the engineering section It is divided into four circles with headquarters at Cawnpore, Meerut, Partabgarh and Hardoi, each in charge of an assistant agricultural engineer. Wells are a very important means of irrigation. The water of the rivers of the provinces has been fully used for irrigation by means of canals and only the underground supplies remain. The work of this section is to make those supplies available by effecting improvement in the existing masonry wells and by sinking tube wells, which will bring forth larger quantities of water. Since 1910, 16,000 borings for ordinary wells have been made and, between 1913 and 1926, 200 tube wells have been sunk and 97 were in course of construction in 1927. Government subsidise the construction of tube wells and pumping plant to the extent of Rs. 6,000 per well, exclusive of assistance in the form of *taccavi* and grants-in-aid.

The running cost of a single irrigation works out to Rs. 7-10-9 per acre where the water has to be lifted 40 to 50 feet to the surface. A comparison of this figure with the pitch of water rates is illuminating. The seasonal charge for the irrigation of sugarcane is Rs. 10 per acre when the canal water flows on to the land. Where it has to be lifted, the rate is Rs. 4 only. For rice the seasonal flow rate is Rs. 7-8 and the lift rate Rs. 3. For wheat and barley the flow rate is Rs. 5 and the lift rate Rs. 2-8 respectively per acre. The canal rates given above are those in force on the Upper Ganges and the Eastern Jumna canals. It would appear from the comparison made above that where canals and tube wells are in competition, the latter do not pay unless the water is used for a high priced crop, grown under an intensive system of cultivation.

Cattle-breeding work is carried on at the Madhurikund farm in the district of Muttra and at the Manjhra farm in the district of Kheri. The quality of the United Provinces cattle leaves much room for improvement. The cows give very little milk; for this article chief reliance is placed on the she-buffalo, specially of the Murrah breed of the dry western districts. The draught power of a pair of bullocks does not go beyond an area of 7·7 acres. The problem in the United Provinces is to raise the efficiency of the cow as a giver of milk and that of the bullock for purposes of draft. The cattle-breeding section is tackling this problem along the following lines: (*i*) improvement of the existing breeds by keeping up a supply of selected bulls; (*ii*) exploring the possibility of developing a dual purpose type of animal and (*iii*) studying the technique of dairying. For improving the cattle a scheme of controlled breeding areas is in operation. The

section concentrates its attention on small areas, to which it has loaned its bulls. As the inferior stock is replaced and as the offspring of bulls from the government farms grow up, they are bought back and distributed over other areas. The farms cannot provide the large supply of bulls required for grading up the cattle of the provinces. Hence advantage is taken of the willingness of cultivators to raise young stock for extending the improvement to other areas. A provincial cattle committee keeps the department in touch with the requirements of the provinces.

The educational institutions maintained by the department with the object of providing technical education in the science and art of agriculture are a college, equipped both for research and teaching, at Cawnpore, and a vocational school at Bulandshahr.

The college offers two courses: one is a four years' course, divided into parts, leading to the diploma of L.Ag. with an intermediate diploma controlled by the United Provinces Board of High School and Intermediate Education. The examination for the final diploma of L.Ag. is conducted by the department.

The second course is in the vernacular. Its duration is two years and it is meant for the sons of large landholders, who may not possess the educational qualifications necessary to enable them to profit by the course in English. The ideal before the authorities of the Agricultural Department is to offer a training at Cawnpore to the sons of zamindars equal to that which they could obtain at a university, to make the college, in fact, into a university of the landholding classes. The college has five sections and maintains a farm of 381 acres, a portion of which has been converted into a dairy farm. Estate management and the economics of agriculture form a prominent part of the course. The college is residential.

The numbers on the rolls during the last two years were:

	1926	1927
For the diploma course	78	115
For the vernacular course	50	46

A Governing Body, of which the Director is the chairman and the Principal its secretary, manages the institution.

The vocational school at Bulandshahr was opened in 1921. It is meant for the sons of tenants of substance and those of the smaller zamindars. The course lasts two years and is in the vernacular. The students themselves cultivate the land of the farm. Since 1924, a teachers' training class has been opened. District boards are introducing the subject of agriculture in vernacular middle schools and this course, lasting for one year, is meant to provide technical training to those who are going to teach the subject of agriculture in these middle schools.

A fieldmen's class has also been opened, its object being to provide a short course of instruction for those who cannot attend the regular school course for two years or who desire to learn special methods of cultivation. In addition to this, there is a class for engine drivers, its object being to train men to work oil engines and power plants and to carry out the simple repairs required in modern farm machinery.

It is intended to open two more schools of the Bulandshahr type. The initial cost is estimated at Rs. 2·75 lakhs and the annual at Rs. 30,000.

The institution of short courses in special subjects, *e.g.*, dairying, and intensive cultivation of sugarcane on certain farms, is also under contemplation.

Training in horticulture is to be given at the Cawnpore Agricultural College. Horticulture has been in the executive charge of a deputy director since 1922. There is considerable scope for the development of the fruit industry in the plains and in the hills. The substitution of market gardening for farming on the small holdings in the provinces, as a possible future development, is not to be underrated.

The budget of the department increased from Rs. 7·14 lakhs in 1913-14 to Rs. 20·13 lakhs in 1925-26 and Rs. 24·46 lakhs in 1926-27. The amount voted in 1926-27 was distributed among the various branches as follows:—

(*i*) General: Rs. 5·4 lakhs; (*ii*) agricultural circles: Rs. 6·1 lakhs; (*iii*) cattle breeding: Rs. 2·1 lakhs; (*iv*) agricultural engineering: Rs. 3·4 lakhs; (*v*) agricultural education and research: Rs. 3·9 lakhs; (*vi*) gardens: Rs. 2 lakhs and (*vii*) works: Rs. 1·6 lakhs.

7. IRRIGATION.

The two large rivers, the Ganges and the Jumna, which traverse the United Provinces, are holy. The reason why they are and have been so considered is not far to seek: their waters make life possible. The people depend for their livelihood upon agriculture and agriculture, without water, is out of the question. Over the greater part of the Indo-Gangetic plain, irrigation is necessary for the *rabi* and sometimes for the *kharif* crops also, when breaks occur in the monsoon. The sources of water are (*i*) rains; (*ii*) canals, bringing water from the great rivers; (*iii*) local streams, *jhils* (lakes or depressions) and tanks and (*iv*) wells.

Canals play, and have played in the past, a great part in ameliorating the conditions of the people. When the first great project was sanctioned by the Directors of the Honourable East India Company in 1841 they laid down a policy which is still applicable to the conditions of to-day. Canals, they said, should be constructed to remove the horrors of famine, to assure the cultivator the means of existence and to ameliorate the conditions of the people.

They were thus constructed, not primarily for revenue, but to protect the people. Throughout the nineteenth century, State effort centres round construction of canals.

The backbone of the canal system in the United Provinces is formed by the Eastern Jumna, the Upper Ganges, the Agra and the Lower Ganges canals. The Eastern Jumna takes off from the river, in the north of the Saharanpur district, about 100 miles from its source. It is the most remunerative canal in the province and, with one exception, the most remunerative in India. In 1926-27, it irrigated 350,000 acres.

The Upper Ganges Canal, the greatest in the province, was completed in 1854. In 1926-27, it irrigated 1,180,400 acres. In 1920, its permanent headworks were completed at a cost of Rs. 39 lakhs. The unsatisfactory system of throwing temporary dams across the river every year for diverting supplies of water into the canal was thus rendered unnecessary.

The Lower Ganges Canal, opened in 1878, was constructed to irrigate the lower portion of the *doab* and to supplement supplies to the tail portions of the Upper Ganges Canal. In 1926-27, it irrigated 776,300 acres. The two canals, the Upper Ganges and the Lower Ganges, form one system.

The Agra Canal takes off from the Jumna near Delhi. It was opened in 1874 and was designed to irrigate 280,000 acres in years of drought. It actually irrigates an average area of 111,000 acres of *rabi*, and 123,000 acres of *kharif* crops.

Between 1840 and 1860, smaller canals, drawing their supplies from hill streams, which had fallen into disrepair, were reconstructed and considerably extended in Rohilkhand.

Since 1880, attention has been directed to the rivers in the south of the province. The rivers of Bundelkhand, the Betwa, the Ken and the Dassan, do not, like the Ganges and the Jumna, receive abundant supplies of water from the snows of the Himalayas. They are subject to floods in the rains but shrink to very small dimensions in the cold weather and would be entirely ineffective for irrigation but for the fact that the configuration of the country and the presence of rock make the construction of reservoirs, for impounding the flood waters, possible. These reservoirs involve the construction of huge dams and submergence of extensive areas of land and are expensive. The following protective works have been opened in this part of the province: the Betwa, in 1885, with a storage capacity of 3,000 million cubic feet; the Ken, in 1906 in the district of Banda, with a supplementary reservoir at Gangao, completed in 1917; and the Dhasan, in 1910, protecting the district of Hamirpur. The district of Mirzapur is served by the Gorai and the Ghagar canals, completed in 1918. The reservoir of the Ghagar has a storage capacity of 5,000 million cubic feet, commands an area of 250,000 acres and is the largest lake in the province. In 1926-27 it irrigated 13,300 acres.

Smaller works and extensions of old productive works have also been undertaken. The Majgawan tank and canal in Hamirpur and the Barwar lake and canal were completed between 1917 and 1923.

Since 1880, no productive works of any magnitude have been completed. One productive work, however, which is the largest in the province, is now under construction and will be completed in 1930. The Sarda

Canal project, combining in itself the two projects of Sarda-Kichha and Sarda-Oudh, with headworks at Banbassa, on the border of Nepal, is designed to irrigate the Sarda-Ganges *doab*. The canal will have a discharge of 9,500 cusecs as compared with the 8,000 cusecs of the Upper Ganges. The estimate of its cost is Rs. 9·5 crores; the return 7·7 per cent on the capital outlay; and the area it will irrigate will be 1·7 million acres. The average area irrigated at present from canals amounts to a little over 3 million acres. With the completion of the Sarda project, this area will be increased by more than fifty per cent. If the scheme proves successful, its complementary work, the lower Sarda Canal, will be taken in hand.

Supplementary storage reservoirs for the Betwa, the Ken, the Dhasan and Ghagar canals and small projects taking off from the Paisani and Ohen rivers in Bundelkhand might add another two or three hundred thousand acres in future to the irrigated area of the province.

The maximum area irrigated from canals will be nearly four-and-a-half million acres. This limit is fixed by the supplies of water available. Any further expansion of the area irrigated can only take place by a more economical and scientific use of the limited supplies of water. It is estimated that fifty per cent of canal water is at present wasted, chiefly by the cultivator.

The statistics relating to the system of government irrigation works are summarised below. In 1926-27, the length of main canals was 1,903 miles, that of distributaries 10,216 miles, of drainage cuts 3,680 miles and of escapes 344 miles. The total length was thus 16,143 miles in 1926-27. In 1931, it will be 22,530 miles and in 1941, 22,600 miles. The capital outlay on all government irrigation works up to 1926-27 was Rs. 19·69 lakhs. By 1931, it will be Rs. 2,230 lakhs. The gross revenue in 1926-27 was Rs. 163 lakhs. It is estimated that it will rise to Rs. 175 lakhs in 1931 and to Rs. 240 lakhs in 1941. Working expenses were Rs. 65·5 lakhs in 1926-27, and for 1931 and 1941 they are estimated at Rs. 75·0 lakhs and Rs. 82·0 lakhs, respectively. The net revenue in 1926-27 was Rs. 97 lakhs. For 1931 and 1941, the estimated amounts are Rs. 100 lakhs and Rs. 158 lakhs, respectively. The interest charge amounted to Rs. 73·7 lakhs and will be Rs. 88·0 lakhs in 1931 and 1941. The net profit was Rs. 23·3 lakhs in 1926-27 and for 1941 it is estimated at Rs. 70 lakhs. The total area of crops irrigated by all sources of irrigation, both government and private, in 1926-27 was 10,816,000 acres or 26 per cent of the total cropped area.

The direct benefits of canals are: (1) an increase in the cultivated area; (2) substitution of the more valuable for less valuable crops; (3) avoidance of famines; (4) increase in land values; (5) increase in outturn of crops. In regard to increase in land values, it may be mentioned that, in 1877-78, the price of land varied between Rs. 30 and Rs. 80 per acre for land near the Deoband branch of the Upper Ganges Canal. In 1909 the branch was remodelled and Government had to pay from Rs. 88 to Rs. 146 per acre. In some areas, the increase has been fourfold.

Supplementary benefits consist in the provision of power produced at the canal falls for mills, the raising of plantations for fuel and timber, production of grass on the canal banks for cattle and supply of water to the tanks in Bundelkhand for the use of cattle.

The charges for water are fixed in relation to (1) the amount of water necessary to bring a crop to maturity, and (2) the value of crops. Rates are higher for the more valuable crops, grown usually in the *rabi* season. Sugarcane, which is on the ground for a whole year, pays the highest rates. In America, the ratio of water rate to the value of the crop is one-fifth or one-sixth; in Egypt one-seventh and in India about one-tenth. In 1926-27, the average value of an acre of sugarcane grown under irrigation was about Rs. 150 and the charge for water on the main canals only Rs. 10 per acre. The average value of wheat raised on an acre was Rs. 73 in the same year and the water rate Rs. 5; the value of rice Rs. 46 and the water rate Rs. 7-8. It may be mentioned here that the charge for water for any one crop is not uniform on all the canals. Each tract served by a system of canals has its own rate which is uniform throughout that tract. Again, flow rates are higher than lift rates.

Careful attention has been paid in the past to the question of drainage. Construction of canals has been undertaken in such a manner as to avoid interfering with the drainage of the area. No waterlogged areas have consequently manifested themselves.

The attention of the Irrigation Department of the United Provinces is being directed more and more towards questions of research. Prevention of avoidable losses, *e.g.*, through seepage, faulty design and construction of the water courses of the cultivator, defective preparation of the fields for receiving the canal water by the omission to divide the fields into suitable compartments, and determination of the amount of water necessary for a crop, should result in spreading the benefits of canal irrigation over a wider area.

The second source of irrigation is from small streams and *jhils* (lakes). The use of water from these is governed by customs, which are recorded in the village papers. These customs secure to the different interests something like a fair share of the limited supply available. This source serves to help the late maturing rice and there may be enough for a first watering of the *rabi* crops. Generally, it gives out when the need for water is greatest, *e.g.*, in a dry year.

The third source is tanks, a word which may cover a huge modern reservoir impounding the flood waters of the vast catchment area of a river in Bundelkhand or it may mean an excavation in the level ground covering a few acres of land in the *doab* proper. Tanks in the latter sense are usually shallow and are not capable of providing irrigation on a large scale. The cost of excavation increases with the depth and thus water cannot be stored in large quantities. These tanks provide water for the use of man and beast, besides giving a first watering to a certain amount of *rabi*. Like *jhils*, they cannot be relied upon in periods of drought, when the need for water is greatest. The cultivator

understands from long experience the technique of their construction. Their bed is of clay, to reduce the loss of water to a minimum.

Wells, however, form the most important source. In 1926-27, the total net area irrigated was 10·3 million acres out of which wells were responsible for 5·4 million acres. South of the Jumna, wells are sunk into rock to a great depth. In the Indo-Gangetic plain, the conditions are specially favourable for the successful digging of wells. The depth at which water is found may vary from 10 to 100 feet. The ordinary wells are of two kinds, percolation and spring wells. The depth of the latter is the greater; they draw water from beds of saturated sand, enclosed in clay; they are more reliable in times of drought, since the water exists in larger quantities and, even if they dry up, they remain serviceable afterwards. Percolation wells are cheap, but not durable, and, since only the percolation level is tapped and not the more abundant supply found in beds of coarse saturated sand, the quantity available for irrigation is limited. The cost of a well is determined chiefly by the need for lining. No lining is ordinarily necessary for stiff clay soil; with sand or loam, it is different. The whole or only a part of the well may require a lining. If it is a part only that requires protection, either twigs, (usually *arhar* stalks and coarse grass) are fixed in, or pieces of wood, or a cylinder of bricks. If the entire well is to be protected, cylinders of masonry, cemented or uncemented, are either built up from below or sunk down from above.

The methods in common use for lifting of water are: (1) an ordinary basket, closely woven, held at both ends by ropes, for lifts of less than four feet. Two men are necessary for working the basket and four for a full day. This method is wasteful of effort, as much of the water spills back, but it is cheap. (2) An alternative method to the basket lift is the chain pump, which consists of a series of discs on an endless chain passing over a wheel and through a pipe. As the wheel is turned, the discs bring up a constant stream of water. (3) For shallow percolation wells, the water is lifted by means of a *charkhi* or a *dhenkli*. These are simple arrangements consisting of a wooden frame and a pole, at one end of which there is a weight to counterpoise a jar or bucket which is dipped in. For lifts under twenty feet no other method has yet been devised which can compete with these indigenous contrivances. (4) For deeper wells, a huge leather bucket drawn by bullocks, walking down on inclined plane by the side of the well, is used. In the western districts, two pairs of bullocks are used and in the eastern, one pair. (5) In the extreme north and extreme south, the Persian wheel is used. (6) Lastly, mechanical power, chiefly from the use of oil engines, is slowly coming in. The ordinary cultivator cannot afford the initial cost and its economical use requires a minimum supply of water which must be kept up. The expense of raising water is very much less than that involved by the indigenous methods.

The amount of water required per watering and the total number of waterings necessary to bring a crop to maturity vary with the soil and the crop. Very sandy soils absorb a very large quantity. Heavy clay does not require irrigation. Between these two extremes there are

well-drained sandy soils and rich loams. The former require more water than the latter.

The cultivator does not use canal water with that care and economy which he shows in the case of water drawn from wells. In his use of well water, he prepares the land first with great skill, dividing it into small compartments and the more valuable the crop the smaller the size of these compartments. For instance, a poppy field will have much smaller divisions than a barley field. Compartments are much larger in tracts served by canals than in those under irrigation from wells. Again, within irrigation tracts, the size of the compartments will be larger for flow than for lift irrigation.

The grant of life tenancies is expected to induce the cultivators to increase the number of wells and, if the co-operative movement develops in the province, the question of the supply of capital will not be such a hindrance as in the past.

8. FORESTRY IN RELATION TO AGRICULTURE.

The cultivator dwelling in that small part of the United Provinces in which forests exist looks upon them as a source for the satisfaction of his immediate needs. He does not realise that needs have an awkward tendency to recur. He sees no point in a judicious and economical exploitation of forests, with a due appreciation of all needs, of the future as well as of the immediate present and of the general public as well as of the dweller on the forest borders. Such matters as the value of timber supplies to the economic welfare of the whole province and the steady and unseen influence of forests in retarding the rapid flow of water, and thereby saving agricultural land from injury and destruction produced by erosion, and floods, are hardly appreciated. Further, the cultivator perceives no connection between forests and well-regulated supplies of water in canals, which are so important for the welfare of the people in the plains. These matters pre-suppose a degree of insight into scientific treatment of forests which he does not possess.

State action in the interests of the general welfare and to protect the cultivator from the consequences of his own recklessness has taken the form of control of forest areas. Forests have been divided into two classes, reserved and protected. Greater latitude is usually allowed in protected than in reserved forests.

The area under forests controlled by the Forest and Revenue departments amounts to some 12,267 square miles, being eleven per cent of the total provincial area. Out of this total, 5,167 square miles are classed under reserved and 7,100 under protected forests.

With the exception of some small forest areas on and near the Central Indian hills of Bundelkhand, all the forests lie in a narrow belt along the borders of Nepal and along the foot of the Himalayan hills and within the hills. There are no forests in the Gangetic plain proper. In the plains, thousands of acres of good agricultural land have been destroyed by the destructive action of water in the past. In one district alone, it

is estimated that 400 *bighas*, equivalent to 133⅓ acres of land, are eaten up by water every year. In such areas, known as ravine lands, the Forest Department is attempting the policy of afforestation, the objects of which are (1) to prevent the further erosion of agricultural land by water and the spreading of ravines, (2) to create a local supply of fuel, (3) to improve the grazing and (4) to create fodder reserves where none existed before.

The special afforestation division has had on hand a yearly programme of 2,000 acres. There are other large areas in the plains which can be made to serve the needs of agriculturists, if only the Forest Department can control reckless grazing by devising a suitable system of rotation, and if stall feeding becomes common. Afforestation is proceeding in the districts of Etawah, Agra, Cawnpore, Unao and Aligarh and also in Bundelkhand.

Apart from ravines and waste land, there are interspersed all over in the plains considerable areas of heavy clay soil, impregnated with salts to such an extent that cultivation is impossible. Attempts are being made to afforest such areas and, even if they do not prove financially successful, it has been demonstrated that good crops of fodder grass can be produced by simple protection. The fuel and fodder supplies would be considerably increased, if progress were more rapid and public opinion realised the importance of action in its bearing on the advancement of agriculture.

In the montane and sub-montane tracts lie the bulk of State-managed forests. Reserved forests are always under the direct management of the Forest Department. Protected forests are in some places in the charge of the Revenue and, in others, of the Forest Department. The chief species of trees in these Himalayan forests are *sal*, deodar, oak and pines.

The benefits which cultivators derive from forests are firstly, grazing, which may be free, or at privileged, or at full rates; secondly, the right to extract timber, possessed by cultivators living in or near forests; thirdly, such right-holders may take away fuel; fourthly, they may appropriate bamboos, within limits, for the satisfaction of their requirements. Minor forest products, *e.g.*, leaf litter and humus are also taken without let or hindrance. Building stone, lime, slates, fibre for ropes, materials for baskets, berries and fruits for various uses are also available for the use of cultivators in forest areas.

Grazing is provided annually for over a million animals, excluding large numbers in Kumaon, which are never counted. The value of free or privileged grazing foregone by the Government comes to nearly Rs. 3 lakhs a year and that of forest produce, given away, to about Rs. 2¾ lakhs.

To meet the requirements of the bulk of the population, which lives in the plains, a more active policy of afforestation of uncultivable waste, ravine and *usar* lands is necessary. The forests cover only eleven per cent of the total area, and their distance from the chief agricultural tracts is a serious obstacle. The needs of the population in the plains

can be met satisfactorily if production of fuel, timber and grass is in their immediate neighbourhood.

The question of communal management of small village forests is receiving attention in the Kumaon Hills.

9. GENERAL EDUCATION.

There are in the United Provinces 5 universities, 34 intermediate colleges, 127 English middle and 188 high schools. Four of the universities are teaching and residential; the fifth, that recently created at Agra, is an affiliating and examining institution. For the supply of teachers to the English school system, three training colleges are maintained by Government and one each by the universities of Benares and Aligarh. The rural population does not frequent any of the higher institutions in which instruction is given through the medium of English. Education for the mass of the people is provided by the vernacular school system. It is, therefore, proposed to consider only this system.

The vernacular schools for boys are of two grades (1) primary and (2) middle. In 1927, the total number of primary schools managed by district boards was 13,759 and of middle schools 576. In addition there were 4,201 primary and 12 middle schools, which were aided by local boards.

The district boards spent on education Rs. 100 lakhs, of which Rs. 73 lakhs came out of provincial revenues and Rs. 27 lakhs were provided out of their own resources. The boards' expenditure was almost entirely on the education of boys (Rs. 96·7 lakhs) and only Rs. 3·3 lakhs was spent on the education of girls. The total number of boys attending district board vernacular schools is 879,000, of whom about 822,000 are in primary and 57,000 in vernacular middle schools. The total number of boys of school-going age, between 6 and 11 years, is estimated by the Education Department at 2,500,000. With their present expenditure, the boards can provide education for one million boys. For the education of the remainder, 1·5 millions, another Rs. 1·5 crores would be required (excluding additional expenditure on direction, inspection, training of teachers, buildings and equipment). If the boards used fully their powers of taxation it is not expected that they could raise more than Rs. 14 lakhs. The difference between the amount necessary for giving education to 1·5 million boys and the additional amount which it is estimated the boards might be able to raise would fall on provincial revenues. It has been pointed out already in the section on Provincial Income and Expenditure that one characteristic of provincial revenues is their inelasticity and, should the present tendencies continue, this feature will become more marked. The above calculation takes into account only boys of school-going age. The girls whose number cannot be less, if educated apart from boys, would require another Rs. 2·5 crores, recurring. The total annual recurring expenditure on the education of both boys and girls in rural areas, would be about Rs. 5 crores, if the provisions of the District Boards Primary Education Act were generally enforced. The problems of financial ways and

means thus loom large in any scheme of free compulsory primary education for the mass of the agricultural population. So much for future developments.

In the vernacular school system, the aim is to spread literacy and to develop faculty. For the attainment of both objects, the teacher is much more important than mere syllabuses, courses of study and curricula. Unfortunately, the scholars do not remain long enough at primary schools to attain either of these objects. Attendance during the period of enrolment is also unsatisfactory. The course in primary schools lasts for five years and in middle schools for three years. The Director of Public Instruction has estimated that, out of every 100 boys who enter a primary school, 58 complete the course meant for infants, 44 reach class I, 31 class II, 22 class III and only 16 class IV. The system is thus wasteful, since boys do not stay long enough to derive permanent advantage. The reasons for this diminution in the successive classes are stated to be (1) the demand for child labour; (2) the prejudice against schools as rendering boys unfit for the occupation of their fathers, *viz.*, agriculture; (3) the inefficient system of teaching and (4) unwillingness of parents to send their children to schools outside their own village.

Irregular attendance arises from inclemencies of the monsoon, prevalence of malaria and other epidemics after the rainy season, and from the occurrence of numerous feasts, festivals and marriage ceremonies. The long drawn out harvests, the inadequate and unhygienic buildings in which schools are held and the inefficiency of the teaching, especially in the infant classes, also interfere considerably with regularity of attendance.

It is considered that these two evils of low enrolment in higher classes and irregular attendance during the period of enrolment can be largely diminished by introducing compulsion gradually. It is expected that the District Boards Primary Education Act of 1926, under which power has been given to district boards to introduce compulsion in the whole or any part of the areas under their jurisdiction, will materially eliminate this waste. The Director of Public Instruction considered it also desirable to amend the District Boards Act, with a view to conferring larger powers on the education committees of district boards. Nomination of public spirited gentlemen, with a keen interest in primary education, to the committee is also necessary. The members of district boards concern themselves more with questions of promotions and transfers of the teachers than with the improvement of education.

Vernacular schools are administered for the boards and inspected on behalf of the Education Department, by officers of the department. In each revenue district there are four or five sub-deputy inspectors with one deputy inspector to control and supervise the work of his subordinates. An officer of superior status, called an inspector of schools, is stationed in each revenue division, consisting of four or five administrative districts. He controls the agency for inspection working in the different districts, with the help of an assistant inspector.

The extent of literacy may be judged from the following figures which include the urban as well as the rural population, and are taken from the

Census Report of 1921. Out of every thousand of the population, there are only 37 literates: out of every thousand males, 65 and out of every thousand females, 6. The figures in 1911 were 34, 61 and 5 respectively. Measured by reference to natural divisions, Himalaya West is far more literate than any other division, the reason being that the majority of the people are of approximately equal and fairly high status. The western portion of the plain has gone ahead of the central. The plateau and the eastern plain have made considerable progress. There is retrogression in Sub-Himalaya East, in comparison with the figures for 1911.

Literacy among cultivators may be gauged by reference to figures of literacy by caste. Cultivators in the United Provinces belong chiefly to the following castes: Jat, Kachhi, Kurmi, Lodha and Tharu. The numbers of literates per 1,000 of males and females are:

Caste	Male	Female
Jat	51	2
Kachhi	10	4
Kurmi	30	1
Lodha	13	1
Tharu	54	2

For pastoral castes, the figures are given in the following Table.

Number of literates per 1,000

Caste	Male	Female
Ahir	12	0·5
Gadariya	6	0·4
Gujar	19	1·0

For castes, from which agricultural labourers are chiefly drawn:

Number of literates per 1,000

Caste	Male	Female
Chamar	2	0·2
Kori	8	0·3
Luniya	11	0·1
Pasi	3	0·1

For castes, members of which chiefly own land, the figures are:

Number of literates per 1,000

Caste	Male	Female
Bhuinhar	166	10
Rajput	114	12
Taga	69	4

The only inference that can be drawn from these figures for the various castes is that literacy in a caste varies directly with its economic and

social position. If the social position is high, the figures for literacy are also high. The more submerged a caste is in position, the worse off it is as regards literacy.

Efforts have been made in the last three or four years to introduce specially trained teachers into certain vernacular middle schools managed by district boards, to give instruction in agriculture as a separate subject. Government bear the whole of the cost of training the teachers and half the initial cost of purchasing cattle, equipment and land (about five acres) for the farm attached to each of the schools. The non-recurring cost for equipping a school to provide teaching in agriculture is Rs. 4,000. The boards bear the recurring cost, estimated at Rs. 350 per annum, and half of the non-recurring cost, *i.e.* Rs. 2,000. Manual training has been introduced into 29 vernacular middle schools, with a view to making the course less literary and more practical; a further extension of this scheme is being considered. English is being taught in about 150 vernacular middle schools thus making easier the path of boys desirous of joining English high schools from vernacular schools.

The problem of improving rural education in the United Provinces resolves itself into improving the method and quality of teaching by the provision of more and better teachers and by improving their prospects.

Better buildings for schools are also necessary. More than half of the schools managed by district boards have only a borrowed habitation. It is not the school building of the village but the house of a moneylender or the premises of the village police station, which attract a visitor's attention. A very large non-recurring expenditure, estimated at a crore of rupees at least, is required to provide adequate buildings for existing primary schools.

10. CO-OPERATION.

The beginnings of co-operation in the United Provinces go back to the year 1901, when a few credit societies were organised by Mr. Dupernex, I.C.S. A Co-operative Department was established in 1904 after the passing of the Co-operative Societies Act in that year. At the end of 1926-27, there were in existence 75 central societies, 287 non-agricultural primary societies, chiefly credit, and 5,880 agricultural primary societies, of which 5,874 were credit and 6 non-credit societies. There is no Provincial Co-operative Bank. The department is managed by the Registrar who then had the help of 2 deputies, 2 assistants and 27 inspectors. The auditors, who then numbered 52, were paid by Government but central banks and societies contributed the greater part of the expenses of their maintenance; in addition, central banks and societies maintained a staff of managers and supervisors who were not paid out of public funds and were not under the orders of the Co-operative Department. The government expenditure upon the movement in 1925-26 was Rs. 2·23 lakhs as compared with Rs. 6·36 lakhs in the Punjab and Rs. 6·28 lakhs in Madras. In 1926-27 the cost to Government was Rs. 2·15 lakhs. The progress of the co-operative movement since the organisation of the department is set out in the

following Table, taken from the provincial memorandum prepared for this Commission.

Year	Total number of societies and central banks	Total membership of primary societies	Total capital involved in the movement	Total owned capital of central banks and societies.
	No.	No.	Rs.	Rs.
1904-05	150	12,215	....	....
1905-06	123	10,234	....	47,018
1906-07	170	17,404	....	1,67,612
1907-08	187	38,985	....	2,79,431
1908-09	369	55,067	....	4,76,136
1909-10	789	49,963	....	5,63,862
1910-11	1,258	63,035	....	7,63,189
1911-12	1,946	76,812	....	10,25,452
1912-13	2,530	94,042	....	13,58,282
1913-14	2,800	108,023	....	17,82,066
1914-15	2,962	107,781	....	23,15,601
1915-16	3,190	113,251	....	28,47,691
1916-17	3,246	109,233	76,66,966	33,76,462
1917-18	3,087	97,638	73,21,910	36,31,206
1918-19	3,406	98,527	75,22,107	40,70,571
1919-20	3,721	97,086	75,74,992	42,33,713
1920-21	4,493	110,620	80,83,433	46,04,540
1921-22	5,137	128,113	80,73,042	51,62,101
1922-23	5,609	136,423	1,00,80,342	57,50,738
1923-24	5,755	144,482	1,05,14,167	64,34,263
1924-25	6,000	155,149	1,12,51,865	72,05,319
1925-26	6,238	159,647	1,88,49,170	77,04,460
1926-27	6,242	163,983	1,97,75,823	82,99,282

It is an interesting Table, with its array of figures. No conclusion can, however, be drawn from them. They are merely arithmetical numbers and they can tell us nothing about the societies, whether they are good or bad, dead or alive, co-operative or un-co-operative. The figures for membership may include good co-operators as well as those who may never have heard of co-operation, its principles, practice or message. The capital involved in the movement may represent either genuine or merely paper transactions.

These doubts and difficulties have been brought to light recently by a committee appointed by the Government of the United Provinces. It examined the whole movement and its findings on matters of fact make dismal reading. Briefly, the main conclusions of the committee are that (1) the co-operative movement is not spreading by the momentum of its success and the moneylender is not having sleepless nights; (2) central banks have drawn all threads of authority into their own hands; (3) primary societies are generally effete; (4) the principles of co-operation are not understood; (5) the staff is insufficiently trained and unsuited for work in the villages; (6) the staff is very often corrupt and has in many cases succeeded in corrupting the headmen of the *panchayats* also.

The main concern of central banks is to recover their advances. They are not carrying out satisfactorily the duties devolving upon

them in connection with the organisation, and supervision of primary societies.

The officials of central banks interfere too much with primary societies and have practically killed all co-operative spirit in them. In the opinion of the committee, the primary societies have sinned and are sinning against every canon of co-operation. The members understand neither the purpose nor the business of their society and as their education in co-operative principles is defective, the affairs of the society get into the hands of either servants, who are very often corrupt, or the headmen of *panchayats* (*sarpanchas*) who batten on the members. There is no careful selection of members; loans are not granted for productive purposes only; when granted they are not applied to the purpose stated; there is no supervision by members; loans are recorded as repaid when they are, as a matter of fact, only renewed. Further loans are not recalled and sureties are not held to their obligation; loans are monopolised by *panchas* and their friends. The obstacles to the spread of co-operation in the United Provinces are (1) illiteracy, (2) lack of honorary workers, (3) the hostile attitude of moneylenders, landlords, and the indifference of others, who should be the leaders of their tenantry, and (4) the lack of government staff, the dishonesty of the bank staff and group secretaries, and the tenancy law and social conditions which, till recently, gave very little security of tenure to the tenants.

Some instances of outrageous malpractices have been recorded by the committee. In the district of Budaun, there were 159 societies under the district bank; there are none now. The manager of the central bank had swindled the primary societies for a number of years. When the Registrar came to inspect these societies, the manager sent out a message to the members not to show their pass books, otherwise they would have to pay. No pass books were shown and no redress was consequently obtained. In Sultanpur, the managing director, who was an honorary magistrate as well, enrolled litigants who appeared before him as members of primary societies and advanced loans to them which he took back as his remuneration for selling justice to them. Similarly he would enrol defaulting debtors, give loans to them and thus recover bad debts for his friends. In Moradabad an easy way was discovered of realising irrecoverable arrears of rent due to bad seasons. Societies of tenants were formed and loans instead of being paid to members were retained by the director and others in lieu of their rental demands. Bad seasons came again. The members sank under this load caused by adversity and added to by human ingenuity.

In the words of the committee "if facts are not faced, if drastic action to rid the movement of make-believe is not taken and if supervision is not made real and effective, the collapse of societies in many other areas is inevitable."

11. COMMUNICATIONS AND MARKETING.

The economic changes which have resulted from the introduction of modern means of communication, *viz.*, roads, railways, the post and the telegraph, are seen in the knitting up of internal markets among

themselves and in linking the local to the wider markets of the world. Before 1850, the price of any agricultural staple varied by much more than the costs of transportation from one internal market to another. At the present day it does not. There is a uniformity of price for all markets in the United Provinces. Again, as there was no connection between internal markets, similarly there was none between local and foreign markets. To-day, variations of price in wheat, cotton and oilseeds are felt by the cultivator. Moreover, the means of communications have rendered an exchange of goods easy. The surplus means now so much purchasing power. Formerly, it represented no economic gain. All these changes are, in the main, due to roads and railways, which have been and are influencing, unseen, the traditional economy of the village. The railway lines in the United Provinces are either broad or metre-gauge. In the first category are the East Indian, North Western and the Great Indian Peninsula railways. The East Indian Railway traverses the provinces from south-east to north-west; the North Western passes through the Meerut and Muzaffarnagar districts and the Great Indian Peninsula Railway connects Bundelkhand with Lucknow and Delhi and Allahabad with the Central Provinces.

Among metre gauge railways are (i) the Bengal and North Western, connecting the north-eastern districts with Bengal on one side and Cawnpore, the commercial and industrial centre of the provinces, on the other; (*ii*) the Rohilkhand and Kumaon Railway bringing into touch the north-west of Oudh, Rohilkhand and the high lands of the Himalayas; and (*iii*) the Bombay, Baroda and Central India Railway, which passes through the western portion of the province. Mention may also be made of the Shahdara and Saharanpur Light Railway which opens up the rich tract of the country served by the Eastern Jumna Canal. The province is now opened up except in the montane tract in which there are no railways.

The complaints of traders relate mainly to a seasonal shortage of wagons, on account of which agricultural produce is sometimes held up for a few days more than the patience of traders will allow.

The next agency which has facilitated the free circulation of goods is roads. There are at present 7,710 miles of metalled and 27,670 miles of unmetalled roads. The roads fall into two classes, provincial and local, the major portion of the latter being unmetalled. The first class is comprised of the main arteries of communication. The agriculturist relies mainly upon the unmetalled roads of the second class, before he gets on to the principal roads. There is a provincial Board of Communications, the activities of which are handicapped by the absence of funds. Motor traction is slowly coming in. Its progress would be more rapid if finance permitted an active programme of improvement of old, and of construction of new, roads.

The cultivator sells his produce either to the village shopkeeper, to whom he is very often indebted and thus does not get the benefit of free sale in a market, or to itinerant buyers, called *bhartiwalas* (literally, corn-gatherers), who also squeeze him out in the matter of a fair price.

Sometimes the cultivator may have sold his crop in advance to big firms dealing in raw produce. These firms may be indigenous or foreign. If the crop is an exhausting one like sugarcane, there is the risk of the cultivator being forced to put his land for a second season in succession under that crop, if he has not been able to deliver the stipulated amount of the produce owing to an unfavourable season. With an increase in his resources and with an improvement of the local roads, the cultivator is getting more and more into the habit of trying his luck in the nearest market, which very often is the headquarters town of the district. In such a market, the cultivator experiences all the influences of distant markets.

The busy months are naturally after the *kharif* and *rabi* harvests. The people with whom the cultivator comes into contact are (1) weighmen, (2) commission agents and (3) dealers. The following particulars are taken from the Census Report of 1921 and are applicable to a market typical of the poorer rural areas. In the market of Mau, in the Jhansi district, Bundelkhand, the weighmen's dues are two pies per rupee for grain and one anna per *maund* for *ghi*. The commission agents charge twelve annas to one rupee for their labour. The rate of net profit may be half to three-quarters of an anna per rupee for wholesale and twice as much for retail dealers. The commodities which the cultivator buys are salt, tobacco, *gur*, kerosine oil, cotton yarn and cloth. The rates of profit are summarised below :—

Commodity	Rate of net profit per cent	
	Wholesale	Retail
	Rs. a.	Rs. a.
(1) Salt	3 2	6 4
(2) Tobacco	6 4	from 9 6 to 12 8
(3) Gur	from 1 9 to 6 4	from 6 4 to 11 8
(4) Kerosine oil	3 2	4 6
(5) Cotton yarn	3 2	6 4
(6) Cotton cloth (imported)	6 4	12 8

The value of these figures lies not in their absolute correctness but in the relation which they tend to indicate between wholesale and retail prices. The purchases of the cultivator are retail. Consequently he has to pay far higher prices. The real benefit of an increase in his purchasing power is to be judged in relation to the prices he has to pay.

12. LOCAL SELF-GOVERNMENT.

Local self-government includes both municipalities and district boards. District boards only will be considered in this section, as they are mainly concerned with the welfare of the rural population. Under the District Boards Act of 1922, the boards were reconstituted. Their

number is 48; the total sanctioned number of members is 1,503, of whom 1,407 are elected and 96 nominated. All the boards are under non-official chairmen, elected by the vote of members.

The matters to be administered by the boards are laid down in the Act and include, among other things, the construction, repair and maintenance of roads, bridges and other means of communication; the planting and preservation of trees; the establishment, management and maintenance of hospitals, schools, pounds, works of public utility, *e.g.*, ferries, wells, drainage works, etc.; the holding of fairs and shows; and works and measures likely to promote the health, comfort and convenience of the public.

The income of the boards, exclusive of balances for the year ending March 31st, 1926, was 190·84 lakhs of rupees and the total expenditure 191·41 lakhs. The main sources of income were (*i*) government grants, (*ii*) local rates and (*iii*) receipts from pounds, ferries and schools. Grants-in-aid amounted to Rs. 85 lakhs and Rs. 72·37 lakhs were raised from local rates. The bulk of the expenditure was on education, Rs. 95·39 lakhs; public works (*i.e.* engineer, staff, roads and buildings), Rs. 48·46 lakhs; medical relief, Rs. 18·44 lakhs; public health, Rs. 5·74 lakhs; veterinary assistance, Rs. 2·94 lakhs, apart from Rs. 10·15 lakhs for general administration and collection charges.

Panchayats were constituted in the United Provinces under Act VI of 1920, mainly for the purpose of providing the villages with local courts and checking the volume of litigation in the courts of the stipendiary magistrates and the munsifs. The *panchayats* in the United Provinces are almost entirely judicial in character and very little use has hitherto been made of *panchayats* for village administration. Nor is the *panchayat* supported in any effective way by powers for raising a village rate. The *panchayats* discharge their official duties and their income consists mainly of fines which are imposed and realised by them. The question of developing an administrative *panchayat* is now being specially considered. Departmental or special committees at headquarters of the district boards have met with success.

The district boards held in the year 1925-26 altogether 945 meetings. There is a tendency to multiply their number. This practice is inconvenient and expensive; it discourages regularity in attendance and is largely responsible for the great number of abortive and adjourned meetings. The average percentage of attendance in 1925-26 was 62·60.

The incidence of taxation was Re. 0-2-8 and of income Re. 0-7-10 per head of the total population in 1925-26.

13. PUBLIC HEALTH AND SANITATION.

Until 1919, the Public Health Department consisted of a Director, four assistant directors for general duty and one assistant director for work on malaria. There was no whole-time personnel working in rural areas except the staff for vaccination. Civil surgeons were supposed to look after prevention, as well as cure, of disease in such areas.

Twenty-six of the forty-eight districts have now been brought under the district health scheme which will be extended to the remaining districts as funds allow, and as doctors and sanitary inspectors who have passed the special public health course become available. The province is now completing a fully equipped hygiene institute which gives complete facilities for the training of men in adequate numbers. As funds allow, a trained health staff will then be appointed to the remaining districts and a supplementary staff will be attached to those districts which are already under the health scheme.

The object of the health scheme is that public health questions in each district should be directly in charge of a specially trained medical officer who will be able to instruct the local boards in public health duties and by practical work carry out health propaganda all through the district. The district medical officer of health has one assistant and, in later stages, will have more than one. He also has a trained sanitary inspector for each subdivision, and a special gang of workmen at his disposal. Travelling dispensaries are attached to the district staff for special duty in the case of plague.

The district health staff have been appointed at first in those districts which are specially liable to epidemics of cholera and plague. Their services in checking cholera epidemics have already been most marked and the incidence of cholera mortality has been reduced to half the figure at which it stood five years ago. Epidemic work is under the direct charge of the Collector of the district and arrangements are made by which the subordinate revenue staff and the village watchmen assist the public health staff in reporting and in dealing promptly with the outbreak of any epidemic. It may be mentioned that this epidemic work is in addition to that which is done by the Public Health Department at the big fairs and on occasions when large bodies of pilgrims move about the province.

The district health staff are also intended to devote much time to village sanitation. They are systematically examining each village. They are introducing more sanitary methods of disposing of sullage water, they are teaching the villagers to copy these methods themselves, to clean up waste spaces and to remove manure heaps to a more suitable distance from the inhabited sites. They examine the condition of the wells in each village and are steadily taking action to improve these wells and to protect them from pollution. The simple measures which the public health staff are taking have already had considerable effect and are appreciated by the villagers though the latter are not as yet prepared in many cases to spend money or labour on this class of improvement. Progress is, however, being made and the example will, it is hoped, spread gradually over the province.

For the cure of disease there are fixed dispensaries in every district but their number is low and seldom exceeds ten dispensaries for a rural population of a million. These dispensaries are staffed partly by government servants and partly by district board officers all of whom have received training in the medical colleges and schools of the province.

The expansion of dispensaries is checked by the lack of funds, but a general scheme is slowly being put into operation by which, if the district board contribute half the cost, recurring and non-recurring, of a dispensary, the Government contribute the remainder. This applies also to dispensaries founded by philanthropists; a few dispensaries are added every year by the bequests or grants of private individuals. The larger towns have their dispensaries, but there are still a number of small towns which have at present no dispensary and, as has been indicated, the village population is far from adequately served with medical relief. Special attention has been given to the reduction in the cost of buildings in order that the limited funds at the disposal of Government and the boards may be used as widely and effectively as possible. Another scheme in which assistance is given from provincial revenues is intended to establish doctors in the outlying villages, but this so far has not met with any general success as the doctors are usually unwilling to leave the towns and settle in the rural area.

The central administration of public health now comprises a Director, three assistant directors in charge of ranges, and three assistant directors in charge respectively of the malariology branch and the training at the research institute of hygiene and the publicity bureau.

The institute has two lecturers and there are two other medical officers at the bureau in addition to the assistant director. The bureau occupies itself with preparing short stories and lessons, posters, sets of magic lantern slides, for distribution to all public health officials and travelling dispensaries. The lines of future development are indicated by the intention to divide the rural areas into blocks of convenient size, to replace travelling by fixed dispensaries for the cure, and to station a public health staff for the prevention, of disease. It will then be possible to undertake active propaganda work for removing from the rural population the fatalism which is responsible for so much misery, low efficiency and low output.

The chief causes of ill-health are (*i*) malaria, (*ii*) cholera, (*iii*) plague, (*iv*) small-pox, (*v*) other infectious diseases and (*vi*) respiratory and intestinal disorders. Cholera, plague and small-pox are short and sharp in their devastation.

The general death rate is two-and-a-half times as high as in the United Kingdom. The average excess of the birth over the death rate is 6 per mille. With this rate of increase, population should multiply considerably but it is kept down by epidemics of one kind or another. The influenza outbreaks carried off millions in a few days.

Apart from these epidemics with their terrible destruction, the chief cause of much chronic health and debility is malaria. It is prevalent all over the United Provinces but is much worse in some districts than in others. About one million are reported to die every year of malaria. There are reasons for supposing that this estimate errs considerably on the side of excess, as the village watchman ascribes every case of death which he cannot understand to malaria. Making allowance for such errors, the death rate cannot be less than one hundred thousand

from this cause, which, in addition, is responsible for a considerable proportion of deaths, as a predisposing cause for other diseases ending in death.

One-fourth of the total population of 45 millions get two attacks of malaria every year and only one per cent receive proper quinine treatment. Twenty-five per cent of the population are totally incapacitated for work for two months, besides having a lowered vitality for the rest of the year. The loss of efficiency for the workers, estimated at 18 millions in a total agricultural population of 35 millons, is put down at fifty per cent.

The chief requirement for an effective programme of combating this disease is a very much larger quantity of quinine available at a very much lower price. In 1921, the total stock available for the whole of India was 160 thousand pounds. Double this quantity would be required for the United Provinces alone.

The price of quinine is high and the supplies are totally inadequate. The rural population is now aware of the great efficacy of quinine, but high prices and limited stocks are restricting its more extensive use.

The other measures, the adoption of which would considerably lessen the incidence of malaria, are: (*i*) proper drainage schemes for the whole province; (*ii*) filling in of shallow depressions near every village; (*iii*) inducing the cultivator to keep his irrigation channels clean; (*iv*) proper draining of valuable agricultural land.

Above all, the villager has to be educated and convinced by effective propaganda, so as to create in him the will to make small improvements himself, the labour cost of which would be trifling.

Hookworm is another agent responsible for lowered vitality. The moist eastern districts suffer much more than the dry western districts. About eighty-six per cent of the people in the eastern districts are infected. The incidence of infection becomes less as one proceeds from east to west. Leather foot-wear is the best protection.

Dysentery is another disease which lowers vitality and hence productive efficiency. Better methods of storing manure and proper attention to keeping the drinking water pure in wells should reduce the prevalence of this disease. Powers of taxation have been given to villages with a population of over 2,000 to improve their water supply under the provisions of the Village Sanitation Act.

Grants are also made by Government. Only a very small amount is raised by taxation in villages to which the Act has been applied. For improving the water supply in all the villages, a much greater amount would have to be raised by taxation. The villager has not reached the stage at which he can realise the benefits of improvements so keenly that he is willing to pay for them himself.

GLOSSARY

Abadi ..	.. A village site, an inhabited area; also, settled, cultivated.
Abwab ..	.. An illegal addition to rent demanded by a superior from an inferior holder of land.
Adatya ..	.. A commission agent or broker.
Ain ..	.. Rent-paying value.
Al ..	.. The Indian mulberry (*Morinda citrifolia*).
Aman ..	.. A long-stemmed variety of rice.
Anna ..	.. One-sixteenth of a rupee; equivalent to 1¼ d. at the exchange rate of one and six pence to the rupee.
Arain ..	.. A tribe of market gardeners, mostly Muslim.
Arhar ..	.. A variety of pulse (*Cajanus indicus*).
Arisi ..	.. Rice (*Oryza sativa*).
Asra ..	.. A coarse variety of rice grown in Assam.
Aus ..	.. Summer rice, generally sown on high land.
Babul ..	.. A common tree (*Acacia arabica*).
Bahan ..	.. A large deciduous tree met with on the banks of the Indus in Sind (*Populus euphratica*).
Bajra (Bajri) ..	.. A small millet (*Penniselum typhoideum*).
Bania ..	.. A Hindu trader who is generally also a moneylender.
Bara ..	.. Land containing a high percentage of salt.
Barani ..	.. Unirrigated land depending on rain for its water supply.
Bargadar ..	.. A cultivator who pays his landlord a fixed share of the produce as rent.
Barind ..	.. A tract of high land extending through certain districts in the north of Bengal.
Basmati ..	.. A fine variety of summer rice.
Bazaar ..	.. A market.
Beldar ..	.. A labourer.
Berseem ..	.. Egyptian clover (*Trifolium alexandrinum*).
Bhadralog ..	.. Gentleman.
Bhartiwala ..	.. Literally, a corn gatherer; an itinerant buyer of agricultural produce.
Bhur ..	.. Sandy soil.
Bigha ..	.. A measure of land varying widely; the standard bigha is generally five-eighths of an acre.
Birpak ..	.. An improved variety of *asra* (coarse rice).
Boro ..	.. A variety of rice transplanted in January and harvested in March; grown in marshy land.
Brahmin ..	.. The priestly caste amongst the Hindus.
Bund ..	.. A dam, a field embankment.
Charkhi ..	.. A lever used in raising water.
Chavdi (or chawadi)	.. A shelter house for travellers.
Chettyar ..	.. A moneylender.
Chiki ..	.. Hard muddy soil.
Chipari ..	.. Marshy land, left more or less dry by a river changing its course.

Cholam	The large millet (*Andropogon sorghum*).
Chowkidar	A village watchman.
Chupatti	A cake of unleavened bread.
Crore	Ten millions.
Cumbu	A millet (*Pennisetum typhoideum*).
Dahia	A heavy yielding variety of rice in Bihar and Orissa.
Dai	A midwife.
Dalal	An agent or broker.
Dalali	Brokerage.
Dasar	A soft or light coloured but productive soil.
Desi	Native to the country; indigenous.
Dhaincha	A leguminous fibre plant often grown for green manuring (*Sesbania aculeata*).
Dhenkli	A lever used in raising water.
Dhub	Couch grass (*Cynodon dactylon*).
Diara	A low-lying moist area near a river.
Doab	The tract between two rivers.
Domat	Loam.
Drammar	Soil with a thin surface layer of sand.
Firka	A group of villages in Madras, forming the circle in charge of a revenue inspector.
Ganja	The unfertilised flowers of the cultivated female hemp plant (*Cannabis sativa*); used for smoking.
Gaonbura	A village headman.
Gas	Light loam.
Gaungbaung	The Burman silken head covering.
Georgesail	An improved variety of rice grown in Assam.
Ghi	Clarified butter.
Gola	A grain store.
Gowshala	A refuge home for cattle.
Guar	Cluster bean (*Cyamopsis psoralioides*).
Gur	Unrefined Indian sugar; jaggery.
Haor	A hollow.
Hari	A peasant.
Hat	A market (held on fixed days in the week).
Huri	A tree plantation or reserve.
Inam	A grant of land wholly or partially rent free.
Indrasail	An improved variety of paddy grown mainly in Bengal, Bihar and Orissa, and Assam.
Jahagirdar	The holder of an assignment of land revenue.
Jamabandi	An annual account of lands held in a village and the amount of land revenue due on them.
Jamadar	An officer subordinate to the Agricultural Assistant in the Central Provinces.
Jari	A mixture of varieties of cotton belonging principally to the *Gossypium neglectum* group.
Jat	A cultivating class inhabiting North India.
Jazail	An old match-lock gun.

Jhil ..	.. A natural lake or swamp.
Jhum ..	.. Shifting cultivation in jungle clearings.
Juar (jowar) ..	.. The large millet (*Andropogon sorghum*).
Kabar ..	.. A type of stiff black soil.
Kacha ..	.. Land resulting from recent inundation.
Kaipad ..	.. Sowing of early and late varieties of rice together.
Kaiya (kyah) ..	.. A class of merchants and traders (Marwaris) coming from Marwar.
Kala-azar ..	.. A malignant fever caused by infection by a parasite (*Leishmania Donovani*).
Kallar ..	.. Saline efflorescence.
Kamdar ..	.. A fieldman.
Kandi ..	.. A moderate sized, deciduous thorny tree (*Prosopis spicigera*).
Kanji ..	.. Millet gruel.
Kankar ..	.. Nodules of limestone found in the soil.
Kanungo, Quanungo	.. A subordinate revenue official.
Kapas ..	.. Cotton with seed still adhering; unginned cotton.
Kar ..	.. Sowing of early and late varieties of rice together.
Karnam ..	.. A village accountant.
Karunganni ..	.. A species of cotton (*Gossypium indicum.*)
Katha ..	.. A small tributary.
Khadi ..	.. Home-made cloth.
Khadir ..	.. The low lying moist area near a river.
Khari ..	.. A hard variety of sugarcane.
Kharif ..	.. The autumn harvest; crops sown at the beginning of the rains and reaped from October to December.
Khasera ..	.. A field book.
Khas-mahal ..	.. An estate owned and managed by Government direct.
Khatauni ..	.. A register of cultivating rights; a ledger.
Khel ..	.. A territorial group of communities.
Khudkasht ..	.. Land cultivated by the proprietor himself, for which he pays rent to the whole body of co-sharers.
Khula vesh ..	.. Periodical distribution of land, sometimes also of houses.
Kist ..	.. An instalment of the land revenue.
Korangusamba ..	.. A variety of rice immune to disease.
Korra ..	.. Italian millet (*Setaria italica*).
Kulkarni ..	.. A hereditary village accountant.
Kunbi ..	.. A cultivator.
Kwin ..	.. An arbitrarily fixed area of about 600 acres (in Burma).
Lakh ..	.. One hundred thousand.
Lakhabatta ..	.. An ancient custom in the Chhattisgarh division of the Central Provinces whereby the land was re-distributed periodically in order to ensure to each cultivator a fair share of each class of land in the village.
Lambardar ..	.. A village headman who collects and pays the Government dues of the village and has other duties.
Latisail ..	.. An improved variety of rice.
Lichi ..	.. An evergreen fruit-tree (*Nephelium litchi*).

Longyi	..	The dress of the male Burman : a voluminous attire.
Ma-bap	..	Literally, mother and father ; a protector.
Mahajan	..	A merchant ; a creditor.
Mahal	..	A separate unit of land for purposes of revenue.
Mahali	..	A disease, a form of phytophthora which affects the fruit of the areca palm.
Mahar	..	One of the depressed classes.
Malguzar	..	Literally, revenue payer. A term applied to a proprietor or co-sharer in a village held in ordinary proprietary tenure.
Mamlatdar	..	A revenue officer in charge of a taluka (a revenue division of a district).
Mandi	..	A market.
Mandua, Marua	..	A small millet (*Eleusine coracana*).
Mar	..	Dark and friable black soil.
Matiyar	..	Clay.
Mattiwali	..	Soil enriched by silt.
Maund	..	A weight varying in different localities. The standard (railway) maund is 82·88 lbs.
Mauza	..	A small group of villages.
Mauzadar	..	A revenue collector who generally collects revenue on a commission basis.
Mhote	..	A water bag.
Modan	..	Hill rice.
Muafi	..	Land held free of revenue.
Mukhtiarkar	..	A revenue officer in charge of a taluka.
Mullah	..	A Muhammadan religious preacher.
Mung	..	Green gram (*Phaseolus radiatus*).
Murali aus	..	An improved variety of summer rice, grown in Assam.
Naib tahsildar	..	Assistant to the revenue officer in charge of a revenue division of a district.
Namasudra	..	One of the depressed classes in Bengal.
Nazrana	..	A due paid on succession, transfer of land or on certain ceremonial occasions.
Nidhi	..	An indigenous banking institution in Madras.
Nullah	..	A watercourse.
Ottadam	..	Sowing of early and late varieties of rice together.
Paddy	..	Unhusked rice (*Oryza sativa*).
Pakki	..	Hard muddy soil.
Pan	..	The betel vine.
Panch	..	A member of a *panchayat*.
Panchayat	..	Literally a committee of five. Used to describe an association of any number of persons instituted for objects of an administrative or judicial nature.
Parwa	..	A light yellowish loam.
Paso	..	A waist cloth.
Patel	..	The headman of a ryotwari village.
Patsala	..	An indigenous primary school.
Patta	..	A document showing the area of land held under it and the revenue payable.

Pattadar	A registered holder of ryotwari land.
Patti	A subdivision.
Patwari	A village accountant.
Pial	A verandah.
Podu	Shifting cultivation in jungle clearings.
Pongal	A harvest feast.
Punasa	An early crop.
Pwe	A theatrical entertainment.
Rab	The burning of leaves and branches of trees on ground which is being prepared for a seed bed or for sowing generally.
Rabi	The spring harvest; crops sown in the autumn and reaped at the end of the cold weather.
Ragi	A small millet (*Eleusine coracana*).
Raja	A ruling prince.
Rakar	Bare, denuded, sloping land growing very inferior crops.
Ramayan	A dramatic epitome of the adventures of Rama.
Rao or Raewari	Soil enriched by the detritus of hill torrents.
Retli	Soil with a large admixture of sand.
Roseum	A coarse short-staple cotton (*Gossypium neglectum roseum*).
Ryot	A cultivator.
Ryotwari	A system of tenure under which the cultivator pays the revenue direct to Government.
Sal	A useful timber tree in Northern India (*Shorea robusta*).
Salami	A fee payable to a person, generally a zamindar or a landlord, for the recognition of a transaction in property in which he has an interest.
Sanad	A charter, a certificate of honour.
Sann hemp	A leguminous fibre (*Crotalaria juncea*).
Sarpanch	The chief member of a *panchayat*.
Seer	A weight (usually 2·057 lbs).
Senji	A fodder crop (*Melilotus parviflora*).
Shum	A miser.
Sir	Home farm land; or land held by the landlord directly in his own management.
Taccavi	An advance made by Government to cultivators for agricultural purposes.
Tahsil (Tehsil)	A local revenue division of a district.
Tahsildar	A revenue officer in charge of a tahsil.
Talati	A village accountant.
Tali	A tree largely grown in the north of India (*Dalbergia sissoo*).
Taluka	A local revenue division of a district.
Tanna	A variety of sugarcane.
Tapedar	A village accountant in Sind.
Taungya	Shifting cultivation in jungle clearings.
Tenai	Italian millet (*Setaria italica*).
Tila	An elevated piece of land.

Udu	..	.. The practice of sowing early and late maturing varieties of rice together.
Uppam	..	.. A variety of cotton (*Gossypium herbaceum*).
Usar	..	.. Soil made barren by saline efflorescence.
Viss	..	.. A weight=3·6 lbs.
Wariasi	..	.. Open, sandy soil.
Wunsa	..	.. The amount of paddy set aside for domestic consumption.
Zaid	..	.. Extra crop.
Zail	..	.. A group of villages in a tehsil.
Zaildar	..	.. A revenue officer in charge of a group of villages.
Zam	..	.. A small patch of land, dependent for cultivation upon perennial hill streams.
Zamin	..	.. Land.
Zamindar	..	.. A landowner, a peasant-proprietor.
Zamindari	..	.. An estate; the rights of a zamindar.
Zan	..	.. A woman.
Zar	..	.. Money.

BOMBAY: PRINTED AT THE GOVERNMENT CENTRAL PRESS.

Digitized with financial assistance from
Government of Maharashtra
on 24 February, 2020